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- Additive Mfg/3D Printing
- Arc Welding
- Assembly
- Automation
- Bending & Forming
- Brazing & Soldering
- Business Services
- Coil Processing
- Cutting
- Fastening & Joining
- Finishing/Paint & Powder Coating
- Finishing/Plating
- Gases & Gas Equipment
- Hydroforming
- Inspection & Testing
- Job Shop/Contract Mfg
- Lasers
- Lubrication
- Maintenance & Repair
- Material Handling
- Metal Suppliers
- Plate & Structural Fabricating
- Press Brakes
- Punching
- Resistance Welding
- Robotics
- Roll Forming
- Safety & Environmental Saws
- Software, Machine Controls
- Stamping
- Thermal Spraying
- Tool & Die
- Tooling
- Tube & Pipe Fabricating or Welding
- Tube & Pipe Producing
- Waterjet
- Welding Consumables
- Welding Machines
**SHOW HOURS**

**Monday, Nov. 11**
10:00 AM – 6:00 PM

**Tuesday, Nov. 12**
9:00 AM – 5:00 PM

**Wednesday, Nov. 13**
9:00 AM – 5:00 PM

**Thursday, Nov. 14**
9:00 AM – 3:00 PM

*EAST BUILDING (LAKESIDE CENTER) OPENS AT 9 AM*

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Exhibit-only attendance is FREE through November 8, 2019. Beginning November 9, the cost to attend the exhibits is $50. AWS, FMA, SME, PMA, and CCAI members may always attend the exhibits for FREE with a valid member card.
### EXHIBITOR LIST

**EXHIBITOR LIST**

**3D/ADDITIVE MANUFACTURING**
- 3D Metal Printing Magazine
- 3DXtech
- Alpha Laser - US
- Altair Engineering Inc
- ASM International
- Baker Industries
- BigRep America Inc
- Blues streak 1 Bright AM
- BMF Material Technology Inc
- CDEAS Inc
- Cincinnati Inc
- Creatform
- Desktop Metal
- EnvisionTEC Inc
- ExOne Company
- Formlabs
- Fraunhofer USA Center for Laser Applications
- FreePoint Technologies Inc
- Fusion3
- Gentec Electro-Optics Inc
- GKN Additive
- Globe Metal
- Han's Laser Smart Equipment Group
- HP
- Innovometric Software Inc
- Laserline Inc
- MakerBot 3D Printers
- Markforged
- Matterhackers
- Met-L-Flo Inc
- MicroCare Corporation
- Microtek Finishing LLC
- New Imaging Technologies
- Oak Ridge National Laboratory
- ProManage
- Protolabs
- Raise3D
- Sankuen Industry Co Ltd
- Shenzhen Industrial Man.
- Rapid Prototyping & Manufacturing Co
- Shining 3D
- Siemens Industry Inc
- Stacker LLC
- SintRays
- Sulphos Prototype
- Telbon 3D
- The Additive Report
- Trak Machine Tools
- TRUMPF Inc
- Ultimaker
- Ventil
- Xact Metal
- Xometry

**FINISHING**
- AkzoNobel Powder Coatings
- Alconox
- Alliance Manufacturing Inc
- American Industrial Sales LLC
- Amibérica Inc
- ANAEROBIA
- Andreae Team
- APEL International
- Argon Masking Corp
- Atotech USA LLC
- Axalta Coating Systems
- A2Z Metal Coatings
- Barli Coatings USA
- Bayco by Gaspro Inc
- BG Surface Technologies (Bulk Chemicals Inc)
- BEKO Technologies
- Benko Products Inc
- Box Spray Nozzles
- Bi-State Rubber Inc
- Blast Cleaning Technologies
- Blast Guru LLC
- BlastOne
- Brush Research Manufacturing Co
- Burleigh Industries
- Caldan Conveyor A/S
- Calvary Industries Inc
- Caplugs
- Carbit Paint Co
- Cardinal Paint and Powder
- Cardinal Parts & Equipment LLC
- Carlisle Fluid Technologies
- Castrol
- Catalytic Industrial Systems
- CFM Canadian Finishing & Coatings Magazine
- Chemetall Manufacturing
- Chemetall US Inc
- Chemical Coaters Association International
- ChemQuest Inc
- Chemtec North America LLC
- ClearClad Coatings LLC
- Clemco Industries Corp
- Cold Jet LLC
- Cold-Met Engineered Finishing Solutions
- Columbus Industries Inc
- Combustion and Systems Inc
- Coral Chemical Co
- Cortec Corporation
- CPR Systems
- CTI Systems
- Custom Fabricating & Supplies
- Daifuku
- Decoral System USA Corp
- DeFelsko Corp
- Delfin Industrial Corporation
- Diamond H2O
- Diamond Vogel – Industrial Coatings
- Dinamco Systems
- DMP Corporation
- Dubois Chemicals Inc
- DurOil Technologies Inc
- Durr Systems Inc
- DURUSA LLC
- Dynabrade Inc
- Echo Engineering and Productions Supplies, Inc.
- Egyptian Coatings
- Ectomer Inc
- Emitted Energy
- Engineered Paint Applications
- Enhancement Technologies Inc/Subitex
- EPSI
- Ervin Industries
- ESMA Incorporated
- Euroimpianti Srl
- Eurovac
- FANUC America Corp
- Fischer Technology Inc
- Flex Trim USA
- Fostoria Process Equipment div of TPI Corp
- Frank Lowe
- GAT Finishing Systems
- Gema USA Inc
- General Fabrications Corp
- Global Finishing Solutions
- Goff Inc
- Graco Inc
- HafcoVac
- Hudson Technologies North America
- Henkel Corp
- Hentzen Coatings Inc
- Heraeus Noblelight LLC
- Herr Industrial Inc
- Houghton International Inc
- Hubbard-Hall Inc
- IFS Coatings Inc
- Integrity Metal Finishing Supplies
- INTEK Corporation
- IntelliFinishing
- INTERTEK
- Iowa Area Development Group
- IPCOM - International Paint & Coating Magazine
- IST International Surface Technologies
- D5S Coatings
- Jamestown Coatings
- KeepTheHeat
- Keyland Polymer Material Sciences LLC
- Klinger Paint Co
- Koch Enterprises Inc
- Kyzen Corporation
- LDPI Inc
- Leaxa USA-Self Learning Painting Robots
- LPI Inc
- M L Filters
- Magic Rack/Production Plus Corp
- Marpol Paritici Sanayi ve Ticaret AS
- Marvel Industrial Coatings
- Master Finish Company
- MAVAR Systems
- Michigan Metal Coatings Inc
- Midco International Inc
- Midwest Finishing Systems
- Mighty Hook Inc
- NIKO Track LLC
- Nordic Air Filtration
- Nordson Corp
- Northern Coatings & Chemical
- Novacel Inc
- Parker Engineering of America
- Patriot Metal Finishing Systems Inc
- PEM Inc
- PKG Equipment Inc
- Pneu-Mech Systems Mtg
- Pollution Control Products Co
- Polymer Molding Inc
- Porcelain Enamel Institute Inc
- Powder Coated Tough
- Powder Coating Institute
- PPP
- PrestBlac Inc
- Proceso Ltd
- Products Finishing Magazine
- Quality Finishing Systems
- Rapid Coating Solutions LLC
- Richards-Wilcox Conveyor
- Rohner
- RollSeal Inc
- RPS Safety LLC
- Ruwac
- SAMES KREMLIN
- Sata Spray Equipment
- Scientific Control Laboratories
- Selas Heat Technology
- Sherwin-Williams
- Singer Safety Co
- Southern Systems International LLC
- Spray Systems Inc
- Spray Tech/Junair
- Sprimag Inc
- Surface Engineering Alloy Co
- SurTec Inc
- SWECO
- System Technologies
- Tanis Inc
- TCI Powder Coatings
- Technotrans America Inc
- The Blast Shop
- The Electrocoat Association
- Thermo-Tron-X Inc
- Thermon Inc
- TIGER-VAC USA INC
- Transmet Corp
- Trimac Industrial Systems
- UNiCure Spraybooths
- Uni-Spray Systems Inc
- United Surface Solutions LLC
- V&S Galvanizing LLC
- Valmont Coatings
- Vaportech
- Venjakob / Nutro Inc
- VentCor Systems
- Vitracast America Inc
- Vulkan Blast Shot Technology
- W Abrasives
- Wagner Systems Inc
- Washington Mills Ceramics
- Webb-Stiles Co
- Wheelabrator

**FORMING & FABRICATING**
- 360 Direct
- 3Arm - Roscamit Division of Eurolink Inc
- 3D Fab Light Inc
- 3DCap
- 889 Global Solutions
- ABIS Inc
- Accuracy Machine
- Accupress
- Acrotech Inc
- ACT SYSTEM AMERICA INC.
- Advanced Cutting Systems
- Advanced Robotic Technology
- Advanced Spiral Technology
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- Air Products and Chemicals Inc
- Ajan Elektronik Servis Sanayi Ve Ticaret Ltd St
- AKS Cutting Systems Inc
- Akypapak Uluslararasi Dis Ticaret Mak San Ve Tic A
- ALA Industries Limited - Tik Earund
- Yukan & GHR Hydraulics
- ALCONS Machinery Inc
- Alliance For American Manufacturing
- Alliance Steel LLC
- Allied Machine & Engineering
- Allor Manufacturing Inc/ Plesh Industries
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SPECIAL EVENTS ARE FREE AND OPEN TO ALL ATTENDEES UNLESS OTHERWISE NOTED

MONDAY, NOVEMBER 11

KEYNOTE PRESENTATION
8:30 AM – 9:45 AM

FABx TECH TALKS
In honor of Veterans Day, this year’s FABx will feature a powerful lineup of visionary veterans. These are heroes with incredible stories who have gone on to excel in leadership, business, advanced manufacturing, and workforce development. Drawing on their unique experiences, speakers will captivate and inspire audiences with their frontline stories focused on motivation, team building, innovation, and how to achieve excellence in the business battlefield.

FEATURED SPEAKER:

CHAD HENNINGS
Through a nine-year NFL career and three Super Bowl Championships, 45 successful combat missions with the Air Force, and as one of the most decorated college football players in NCAA history, Chad represents the philosophy that he lives by — that excellence is not a destination, but an identity.

FABx SPEAKERS:

Hernán Luis y Prado, Founder and CEO, Workshops for Warriors
Jason T. Ray, Co-Founder and CEO, Paperless Parts Inc.
Shelly C. Rood, Educational Consultant, Mission Ambition LLC
Michael Walton, Industry Solution Executive (Manufacturing), Microsoft

LEADERSHIP EXCHANGE
12:30 PM – 1:30 PM

EMERGING & ADVANCED TECHNOLOGIES FOR MANUFACTURING 2020
Advanced manufacturing is transforming the economy and jobs, using cutting-edge technology and new manufacturing processes to accelerate innovation. Learn how companies are using advanced technologies to stay at the forefront of manufacturing.

MODERATOR: Dave O’Neil, Vice President, SME Media

PANELISTS:
Chandra Brown, CEO, MxD
Jason T. Ray, Co-Founder and CEO, Paperless Parts Inc.
Michael Walton, Industry Solution Executive (Manufacturing), Microsoft
TUESDAY, NOVEMBER 12

KEYNOTE PRESENTATION
8:30 AM – 10:00 AM
FRANK ABAGNALE JR., Cybersecurity Expert, Best-selling Author and Subject of “Catch Me If You Can”
Renowned international cybersecurity and fraud-prevention expert Frank Abagnale — known as one of the world’s most famous con men — will present a two-part keynote. During the first part of his speech, appropriately titled “Catch Me If You Can,” Abagnale will provide entertaining insight into his life as the notorious imposter of the 1960s. He will then instruct attendees on how to protect themselves and their businesses from fraud during the second part titled the “Art of the Steal.”

LEADERSHIP EXCHANGE
12:30 PM - 1:30 PM
STATE OF THE INDUSTRY: AUTOMATION IN MANUFACTURING
Innovations in robotics and automation have catalyzed the fourth industrial revolution. This panel will explore how automation is changing the manufacturing landscape and cover both the role of technology and people in the future of manufacturing. Experts will share their perspective on the impact of robotics on human workers and the facts vs. fiction of worker replacement. They will discuss identifying key challenges to implementing automation and developing a pipeline to de-risking technology and implementing it on the factory floor.

NETWORKING EVENT
5:30 PM – 7:30 PM Lakeside Center, McCormick Place
INDUSTRY NIGHT
Enjoy a fun-filled evening of food, drinks, and networking during our Industry Night Party! The Chicago Blues & Brews themed event will include live blues music, local craft beer tasting, and much more. We expect this to be a sold-out event so be sure to register early.
Advance ticket price: $50

MONDAY, NOVEMBER 11 & TUESDAY, NOVEMBER 12
AWS PROFESSIONAL WELDERS COMPETITION
Participants will go head-to-head as they complete and clean a single-pass fillet weld in just 5 minutes. Speed and accuracy count, and weldments will be evaluated to the current AWS D1.1 standard by a panel of Certified Welding Inspectors. Those interested in competing must be 18 years or older and weld for a living. Learn more about how to participate in the competition at aws.org/weldingcompetition.
WEDNESDAY, NOVEMBER 13

7:45 AM – 10:00 AM

WOMEN OF FABTECH BREAKFAST

Join us for a networking breakfast celebrating the importance of women in the manufacturing sector. This event aims to foster relationships and dialogue between supporters and practitioners in the field. A breakfast buffet is included. Price: $25

PRESENTATIONS

KEEPING UP WITH TECHNOLOGY

MODERATOR:
Dan Davis, Editor-in-Chief, The FABRICATOR®

SPEAKERS:
Susanne Lauda, Director, Global Advanced Manufacturing Technology, AGCO Corporation
Gretchen Zierick, President, Zierick Manufacturing

STARTING A WOMEN'S INITIATIVE WITHIN YOUR ORGANIZATION

SPEAKERS:
Monica Silliman, Manufacturing Engineering Manager, Combine Final Assembly, John Deere Harvester Works
Erin Welken, Manager, Business Process Improvement, Global Agriculture and Turf Supply Management Organization, John Deere

8:30 AM – 9:30 AM

KEYNOTE PRESENTATION

GRANT IMAHARA, Former Host on Discovery's “Mythbusters” and Animatronics Engineering Expert

On stage, Grant provides a behind-the-scenes look at his work on various sets and productions while also touching on the importance of advancing the engineering/manufacturing industry.

Grant has credits on numerous blockbusters including The Matrix sequels, A.I., Galaxy Quest, Terminator 3, Van Helsing, and Star Wars: Episodes 1-3.

LEADERSHIP EXCHANGE

12:30 PM – 1:30 PM

THE IMPACT OF DISRUPTIVE TECHNOLOGY AND THE FUTURE OF MANUFACTURING

The pace of innovation is incredibly fast and new things are being discovered daily. As technology has advanced and becomes embedded in plants, warehouses, and throughout the supply chain, businesses have needed to adapt to stay competitive. Many already have, but the path toward digital transformation is different for every company. Come hear our panel of experts cover disruptive technologies from 5G and IoT to AI and robotics & automation, share case studies, and help manufacturers understand and explore the challenges and benefits that implementing these technologies entails.

MODERATOR:
John R. Brandt, CEO and Founder, The MPI Group

PANELISTS:
Mohamed (Mo) Abuali, Ph.D. Managing Partner, IoTco
Dave Beck, Founder and Managing Partner, Foundry 45
Greg Mark, CEO and Founder, Markforged
Tim Weber, Global Head of 3D Metals, HP 3D Printing
THURSDAY, NOVEMBER 14

LEADERSHIP EXCHANGE
11:00 AM - 12:00 PM

21ST CENTURY WORKFORCE: BUILDING TOMORROW’S WORKFORCE

Manufacturers in the 21st century must make it a precedence to have a workforce that is educated, diverse, and motivated. Organizations need to produce a more globally competitive workforce that can meet the demands of an evolving digital economy and adapt to the trends and challenges of managing a multi-generational workforce. Come hear our experts share their strategies and some actions to address the challenges for the future.

MODERATOR:
Kord Kozma, Global Director of HR, Nidec Press & Automation

PANELISTS:
Hernán Luis y Prado, Founder and CEO, Workshops for Warriors
Rob Tessier, National Director of Advanced Fabrication Technologies, Airgas
Dean Steadman, CNC Education Program Manager, FANUC America

MONDAY, NOVEMBER 11 - THURSDAY, NOVEMBER 14

SMART MANUFACTURING HUB

The Smart Manufacturing Hub will feature several advanced manufacturing technologies, including automation, advanced materials, 3D printing, the Industrial Internet of Things (IIoT), 3D scanning, and more. Technical presentations from industry-leading smart technology providers will provide insight on recent developments in this rapidly evolving field.

Sponsored by:
EXPERIENCE LEVELS

The Schedule-at-a-Glance on the following pages provides a quick reference to all the educational programs offered at FABTECH 2019. Note that you can use the following key to find the education that meets your needs.

- **Basic** — Recommended for the attendee who is new to the industry or needs a refresher on the topic.
- **Intermediate** — Designed for the attendee who already has a basic understanding of the subject matter.
- **Advanced** — For the attendee with several years of experience who is seeking more in-depth information.

CONTINUING EDUCATION CREDITS

Individuals who attend AWS Education programs are awarded 1 PDH (Professional Development Hour) for each hour of education program attendance. Individuals seeking FMA Recertification Credits will be awarded 2 credits for each conference session attended (forming and fabricating, cutting, or finishing tracks) plus an additional 2 credits for attending the show. Individuals who attend SME education programs may be eligible to receive 1 credit per hour attended toward their SME-managed recertification requirements.

MEMBERSHIP INFORMATION

Discounted rates for members are available on educational programs. Interested in becoming a member of AWS, FMA, SME, PMA, or CCAI? Find details on each of the event partner associations and membership benefits by visiting their websites today!

aws.org  fmanet.org  sme.org  pma.org  ccaiweb.com
### TECHNOLOGY

<table>
<thead>
<tr>
<th>8:00 AM – 9:30 AM</th>
<th>10:00 AM – 11:30 AM</th>
<th>12:00 PM – 1:30 PM</th>
<th>2:00 PM – 3:30 PM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3D/ADDITIVE MANUFACTURING</strong></td>
<td><strong>NEW! F10</strong>: Application Discovery - Evaluating Real Use Cases for In-Office Metal 3D Printing</td>
<td><strong>NEW! F20</strong>: 3D Printed Tools for Additive Manufacturing Environments</td>
<td><strong>NEW! F30</strong>: The Ultimate Guide to Metal Additive: Mapping the Process from Discovery to Production</td>
</tr>
<tr>
<td><strong>AUTOMATION</strong></td>
<td><strong>NEW! F15</strong>: Move to the 21st Century: The Pro’s and Con’s of Adding Automation to Your Process</td>
<td><strong>F21</strong>: Getting Started with Robotics: A Journey to the World of Robotics</td>
<td><strong>NEW! F35</strong>: Leading and Preparing an Industry 4.0 Organization and Workforce</td>
</tr>
<tr>
<td><strong>CUTTING</strong></td>
<td><strong>NEW! F23</strong>: Cutting for Advanced Materials</td>
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<tr>
<td><strong>FINISHING</strong></td>
<td><strong>NEW! C20</strong>: ABC’s of Infrared</td>
<td><strong>NEW! C21</strong>: I Want to Powder Coat, Now What?</td>
<td><strong>C40</strong>: It’s Your Money - Control Your Costs</td>
</tr>
<tr>
<td><strong>FORMING &amp; FABRICATING</strong></td>
<td><strong>NEW! F13</strong>: Press Brake for Engineers</td>
<td><strong>NEW! F23</strong>: Machine Safeguarding</td>
<td><strong>NEW! F33</strong>: Material Handling</td>
</tr>
<tr>
<td><strong>LASER</strong></td>
<td><strong>NEW! F25</strong>: Lasers for Joining Development and Control</td>
<td><strong>NEW! F35</strong>: Remote Laser Joining &amp; Interface Applications</td>
<td><strong>NEW! F36</strong>: Lasers and Laser Systems for Advanced Manufacturing</td>
</tr>
<tr>
<td><strong>MANAGEMENT</strong></td>
<td><strong>NEW! F17</strong>: Choosing the Best Source of Growth Capital for Your Manufacturing Business</td>
<td><strong>NEW! F27</strong>: Planning for the Present &amp; Paving a Strategic Roadmap</td>
<td><strong>F37</strong>: Job Shop Costing, Estimating and Scheduling for Complex Jobs</td>
</tr>
<tr>
<td><strong>MARKETING &amp; SALES</strong></td>
<td><strong>NEW! F18</strong>: Supercharge Your Networking &amp; Inbound Marketing</td>
<td><strong>NEW! F28</strong>: Your Schematic for Assembling a Powerful Digital Marketing Machine</td>
<td><strong>NEW! F38</strong>: Build a Sales Strategy &amp; Model for Scalable Growth</td>
</tr>
<tr>
<td><strong>SMART MANUFACTURING</strong></td>
<td><strong>NEW! F19</strong>: Current State of Smart Manufacturing &amp; The Connected Viewpoint</td>
<td><strong>NEW! F29</strong>: SMART Manufacturing Basics to Get Started in The Digital World</td>
<td><strong>NEW! F39</strong>: Industrial IoT Case Study - Real World Implementation</td>
</tr>
<tr>
<td><strong>STAMPING</strong></td>
<td><strong>NEW! S20</strong>: Understanding Servo Metal Stamping Presses - Proper Usage, Troubleshoot and Maintenance</td>
<td><strong>S30</strong>: ANSI Z224.1 &amp; OSHA 1910.147 Applications of Alternative Methods for Hazardous Energy Control</td>
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<tr>
<td><strong>WELDING FABRICATION</strong></td>
<td><strong>NEW! W200</strong>: The Welding Economy</td>
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<tr>
<td><strong>WORKFORCE DEVELOPMENT</strong></td>
<td><strong>NEW! F200</strong>: Practicing Emotional Intelligence for Workplace Success</td>
<td><strong>NEW! F211</strong>: The Future of Talent: Attracting and Retaining The Top Talent for the 21st Century</td>
<td><strong>NEW! F212</strong>: Creating Career Path Programs That Empower &amp; Engage</td>
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<td><strong>WELDING</strong></td>
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<tr>
<td><strong>CAREER PATH WORKSHOPS</strong></td>
<td><strong>W17</strong>: Getting Started in Underwater Welding</td>
<td>1:00 PM</td>
<td>3:00 PM</td>
</tr>
<tr>
<td><strong>PROFESSIONAL PROGRAM</strong></td>
<td><strong>W18</strong>: Creating a WPS in 60 Seconds</td>
<td>1:00 PM</td>
<td>3:00 PM</td>
</tr>
<tr>
<td><strong>W23: SESSION 1</strong>: Additive Manufacturing I</td>
<td><strong>SESSION 2</strong>: Modeling</td>
<td>1:40 PM</td>
<td>5:00 PM</td>
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<tr>
<td><strong>SESSION 3</strong>: Arc Welding</td>
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<td>1:40 PM</td>
<td>5:00 PM</td>
</tr>
<tr>
<td><strong>SESSION 3</strong>: Additive Manufacturing I</td>
<td></td>
<td>1:40 PM</td>
<td>5:00 PM</td>
</tr>
<tr>
<td><strong>SPECIAL PROGRAMS</strong></td>
<td><strong>W30</strong>: AWS Prayer Breakfast</td>
<td>7:00 AM</td>
<td>8:30 AM</td>
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</tbody>
</table>

Detailed Education Program session descriptions, speakers, pricing, room locations and more can be found at fabtechexpo.com/edu.
<table>
<thead>
<tr>
<th>Schedule at-a-Glance</th>
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<tr>
<td><strong>WELDING</strong></td>
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</table>

| **SEMINARS** | W11: AWS Educational Overview of Welding Codes and Standards - Day 1 | 8:00 AM | 5:00 PM |
| **CONFERENCES** | W12: Applied Welding Metallurgy | 8:00 AM | 4:00 PM |
| **PROFESSIONAL PROGRAM** | W13: AWS/Weld-Ed Education Conference - Day 1 | 8:00 AM | 12:00 PM |
| **RWMA SCHOOL** | W24: SESSION 4: Solid-State Processes | 8:00 AM | 12:00 PM |
| **EDU. SESSIONS** | SESSION 5: Surfacing & Dissimilar Joining | 8:00 AM | 12:00 PM |
| **SPECIAL PROGRAMS** | SESSION 6: Welding Metallurgy | 8:00 AM | 12:00 PM |
| **SESSION 7: Neural Networks & Machine Learning** | SESSION 8: Additive Manufacturing II | 1:40 PM | 5:00 PM |
| | SESSION 9: Welding Metallurgy II | 1:40 PM | 5:00 PM |
| **RWMA SCHOOL** | W22: RWMA Resistance Welding School - Day 1 | 8:00 AM | 5:00 PM |
| **EDU. SESSIONS** | W23: AWS/Weld-Ed Education Conference - Using Advanced Waveforms in Welding Education | 9:00 AM | 4:30 PM |
| **SPECIAL PROGRAMS** | W31: AWS Awards/AWS Foundation Luncheon | 12:00 PM | 2:00 PM |

Detailed Education Program session descriptions, speakers, pricing, room locations and more can be found at fabtechexpo.com/edu.

- = Basic, = Intermediate, = Advanced
### TECHNOLOGY

<table>
<thead>
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<th>Time</th>
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<tbody>
<tr>
<td><strong>8:00 AM – 9:30 AM</strong></td>
<td><strong>NEW! F90</strong>: The ROI of 3D Printing: Analyze the Cost of Implementing 3D Printing for Your Business</td>
</tr>
<tr>
<td><strong>10:00 AM – 11:30 AM</strong></td>
<td><strong>NEW! F100</strong>: Impact and Quality Considerations for Additive Manufacturing</td>
</tr>
<tr>
<td><strong>12:00 PM – 1:30 PM</strong></td>
<td><strong>F110</strong>: Lasers and Additive Manufacturing Processes</td>
</tr>
<tr>
<td><strong>2:00 PM – 3:30 PM</strong></td>
<td><strong>NEW! F120</strong>: Safely Adopting Additive Manufacturing on The Production Floor</td>
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</tbody>
</table>

### AUTOMATION

<table>
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<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td><strong>8:00 AM – 9:30 AM</strong></td>
<td><strong>NEW! F91</strong>: Effective Automation for Joining in Emerging Technologies</td>
</tr>
<tr>
<td><strong>10:00 AM – 11:30 AM</strong></td>
<td><strong>NEW! F101</strong>: Integrating Robotic Automation into Your Process</td>
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<tr>
<td><strong>12:00 PM – 1:30 PM</strong></td>
<td><strong>NEW! F111</strong>: Which Robot Application is Right for Your Needs?</td>
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<tr>
<td><strong>2:00 PM – 3:30 PM</strong></td>
<td><strong>NEW! F121</strong>: Automating the Material Handling Process - Why Now is the Time</td>
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</table>

### CUTTING

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td><strong>8:00 AM – 9:30 AM</strong></td>
<td><strong>F102</strong>: Advantages of Waterjet Cutting Machining Technology</td>
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<tr>
<td><strong>10:00 AM – 11:30 AM</strong></td>
<td><strong>NEW! C100</strong>: Conveying Effectively</td>
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<tr>
<td><strong>12:00 PM – 1:30 PM</strong></td>
<td><strong>NEW! C120</strong>: Quality Still Counts</td>
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<tr>
<td><strong>NEW! C121</strong>: Powder Coating Troubleshooting</td>
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### FINISHING

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<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td><strong>8:00 AM – 9:30 AM</strong></td>
<td><strong>NEW! C90</strong>: Architectural Coatings - Today and Future</td>
</tr>
<tr>
<td><strong>10:00 AM – 11:30 AM</strong></td>
<td><strong>NEW! C91</strong>: Optimizing Powder Operations</td>
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<tr>
<td><strong>12:00 PM – 1:30 PM</strong></td>
<td><strong>NEW! C92</strong>: Creative Finishing Solutions</td>
</tr>
<tr>
<td><strong>NEW! C102</strong>: Choose Your Weapon - Finding the Right Liquid Applicator</td>
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### FORMING & FABRICATIONING

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td><strong>8:00 AM – 9:30 AM</strong></td>
<td><strong>NEW! F93</strong>: A Modular Approach to Turning Non-Value-Added Time on a Press Brake into Productive Time</td>
</tr>
<tr>
<td><strong>10:00 AM – 11:30 AM</strong></td>
<td><strong>F103</strong>: Press Brake Safety</td>
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<tr>
<td><strong>12:00 PM – 1:30 PM</strong></td>
<td><strong>NEW! F113</strong>: Alternative Forming Processes</td>
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<tr>
<td><strong>NEW! F123</strong>: Press Brake Hurdles</td>
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### LASER

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<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>8:00 AM – 12:30 PM</td>
<td><strong>AWF106</strong>: Laser Cutting Workshop</td>
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### LEAN

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td><strong>NEW! F96</strong>: Lean Principle: Go to Gemba</td>
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<tr>
<td><strong>NEW! F106</strong>: Lean Tools: Lead Production Shop to a Job Shop</td>
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</table>

### MANAGEMENT

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td><strong>NEW! F97</strong>: Ensuring Tomorrow: How to Effectively Choose and Prepare Your Successor</td>
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<tr>
<td><strong>NEW! F107</strong>: Win the Inner Game: Free Yourself of Overwhelm and See Your Highest Potential Come True</td>
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<tr>
<td><strong>NEW! F117</strong>: Diagnose Your Business: How to Free Yourself from Budget Limitations by Finding and Unlocking Hidden Money in Your Operations</td>
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<tr>
<td><strong>NEW! F127</strong>: Enable the Transition to Next Gen - Family Business</td>
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</table>

### MARKETING & SALES

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td><strong>NEW! F98</strong>: Digital Marketing: Strategies &amp; Data for Continuous Improvement</td>
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<tr>
<td><strong>F108</strong>: Business Builders: Make Business Development a Competitive Advantage</td>
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<tr>
<td><strong>F118</strong>: Protecting Original Design: The Importance of IP in Metal Forming</td>
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<tr>
<td><strong>NEW! F128</strong>: A Marketing Framework: From Lead to Sale - Tools &amp; Tips for Fabricators &amp; OEMs</td>
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</table>

### SMART MANUFACTURING

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td><strong>NEW! F99</strong>: The Smart Factory &amp; Feasibility with Case Studies</td>
<td></td>
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<tr>
<td><strong>NEW! F109</strong>: A.I. for Predictive Manufacturing: Zero-Downtime, Zero-Defects</td>
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<tr>
<td><strong>NEW! F119</strong>: Prevent Digital Failure and Benchmark Your Performance</td>
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<tr>
<td><strong>NEW! F129</strong>: Smart Manufacturing on Predictable ROI</td>
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### STAMPING

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td><strong>NEW! S90</strong>: Stamping-1</td>
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<tr>
<td><strong>NEW! S100</strong>: Stamping-2</td>
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<tr>
<td><strong>NEW! S91</strong>: Sensors-1</td>
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<tr>
<td><strong>NEW! S101</strong>: Sensors-2</td>
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### WELDING FABRICATION

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td><strong>NEW! T00</strong>: Optimization of Welding Documentation and Continuity Efficiency Using Computer Software</td>
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### WORKFORCE DEVELOPMENT

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td><strong>NEW! F217</strong>: Operational Excellence for Significant and Sustained Performance With Incentive Pay</td>
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<tr>
<td><strong>NEW! F219</strong>: Leading Innovation &amp; Change Initiatives in Your Organization</td>
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<tr>
<td><strong>NEW! F220</strong>: Manage, Mentor and Develop Your New Workforce &amp; Staff for The Future</td>
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### WELDING

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td><strong>WT1</strong>: AWS Educational Overview of Welding Codes and Standards - Day 2</td>
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<tr>
<td><strong>WT4</strong>: “Welding” Don’t Be Afraid to Ask</td>
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<tr>
<td><strong>WT5</strong>: Stainless Steel Welding D1.5 Structure</td>
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### SEMINARS

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td><strong>WT6</strong>: 6th International Electron Beam Conference - Day 2</td>
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### CONFERENCES

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td><strong>WT8</strong>: Development of a New Standard for Metal Additive Manufacturing: AWS D201/D201M, Specification for Fabrication of Metal Components Using Additive Manufacturing</td>
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### CAREER PATH WORKSHOPS

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td><strong>W25: SESSION 10</strong>: Plenary Session</td>
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<tr>
<td><strong>SESSION 11</strong>: In-Situ Measurement Techniques</td>
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<tr>
<td><strong>SESSION 12</strong>: Honorary Symposium for Prof. D. Olson I</td>
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<tr>
<td><strong>SESSION 13</strong>: Industrial Technology I</td>
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<tr>
<td><strong>SESSION 14</strong>: Process Sensing &amp; Control</td>
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<tr>
<td><strong>SESSION 15</strong>: Honorary Symposium for Prof. D. Olson II</td>
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<tr>
<td><strong>SESSION 16</strong>: Weldability</td>
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### RWMA SCHOOL

<table>
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<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td><strong>W22</strong>: RWMA Resistance Welding School - Day 2</td>
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### TECHNOLOGY

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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>8:00 AM – 9:30 AM</td>
<td>3D/ADDITIVE MANUFACTURING: NEW! F130: How MES Transfers Data Efficiently Through The Additive Manufacturing Value Chain &amp; Business Case Method</td>
</tr>
<tr>
<td>10:00 AM – 11:30 AM</td>
<td>AUTOMATION: NEW! F131: Sensors, Maintenance and Platforms for Leveraging Technology</td>
</tr>
<tr>
<td>12:00 PM – 1:30 PM</td>
<td>FINISHING: NEW! C130: Power Up and Hang On for Efficiency and Savings</td>
</tr>
<tr>
<td>2:00 PM – 3:30 PM</td>
<td>LEAN: NEW! F136: Lean Principle: Science of Lean Culture and Case Studies</td>
</tr>
<tr>
<td>8:00 AM – 10:00 AM</td>
<td>MANAGEMENT: F137: Making Better Decisions as a Business Leader &amp; Tools for Management Success</td>
</tr>
<tr>
<td>8:00 AM – 12:00 PM</td>
<td>SMART MANUFACTURING: NEW! F139: Smart Manufacturing to Successfully Implement the Trifecta; All in Real Time</td>
</tr>
<tr>
<td>8:00 AM – 10:00 AM</td>
<td>WORKFORCE DEVELOPMENT: NEW! F221: How to Win With Personalities &amp; Team Engagement</td>
</tr>
<tr>
<td>8:00 AM – 11:00 AM</td>
<td>WELDING: W20: Starting a Welding Inspection Business</td>
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<tr>
<td>8:00 AM – 11:00 AM</td>
<td>W21: Becoming a Certified Welding Accredited Test Facility for Testing Certified Welders</td>
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<tr>
<td>8:00 AM – 12:00 PM</td>
<td>PROFESSIONAL PROGRAM: SESSION 17: High-Energy Density Processes</td>
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<tr>
<td>8:00 AM – 12:00 PM</td>
<td>SESSION 18: Industrial Technology II</td>
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### EXPERIENCE LEVELS

- **Basic**................. Recommended for the attendee who is new to the industry or needs a refresher on the topic.
- **Intermediate** ... Designed for the attendee who already has a basic understanding of the subject matter.
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Detailed Education Program session descriptions, speakers, pricing, room locations and more can be found at fabtechexpo.com/edu.
EXHIBITS ONLY

Registration is FREE through November 8. Beginning November 9, the cost to attend the exhibits is $50. AWS, FMA, SME, PMA, and CCAI members may always attend the exhibits for FREE with proof of membership.

SPECIAL EVENTS

INDUSTRY NIGHT AT McCormick Place
TUESDAY, NOVEMBER 12
Advance ticket price for attendees is $50 and includes food and drinks, networking, entertainment, and more.

WOMEN OF FABTECH BREAKFAST
WEDNESDAY, NOVEMBER 13
Price for FABTECH Attendees is $25 and includes a breakfast buffet.

EDUCATION PROGRAMS

3D/Additive Manufacturing, Automation, Cutting, Finishing, Forming & Fabricating, Laser, Lean, Management, Marketing & Sales, Smart Manufacturing, Stamping, Welding Fabrication, Workforce Development Tracks

<table>
<thead>
<tr>
<th>Packages (Buy More and SAVE!)</th>
<th>Member</th>
<th>Non-member</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Session</td>
<td>$195</td>
<td>$220</td>
</tr>
<tr>
<td>2 Sessions</td>
<td>$330</td>
<td>$385</td>
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<tr>
<td>3 Sessions</td>
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</tr>
<tr>
<td>4 Sessions</td>
<td>$550</td>
<td>$660</td>
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<tr>
<td>Full Conference: (5 or more sessions)</td>
<td><strong>BEST VALUE!</strong></td>
<td>$750</td>
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**NOTE:** The rate for the 1/2-Day Laser Welding Workshop (Session AWF100) and Leadership Skills & Development Workshop (Session F216) is $365 for Members and $465 for Non-members.

WELDING TRACK

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<tr>
<th>Package</th>
<th>Member Price</th>
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<tr>
<td>AWS Educational Sessions</td>
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<td>1/2-Day Seminar</td>
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<td>AWS Prayer Breakfast</td>
<td>$15</td>
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</table>

* Non-member price for AWS Sessions only includes a one-year AWS Individual Membership.

* Non-member Student Professional Program price includes a one-year AWS Student Membership.

CONFERENCE CANCELLATION POLICY:

Cancellations and refund requests (for paid conference registrations) must be made in writing to Attn: Betsy Bonnell: FABTECH Conference Cancellation or sent to bbonnell@sme.org no later than October 28, 2019, to receive a full refund minus a $50 administrative fee. Cancellations received after this date are non-refundable. Substitutions allowed.
NEW! F10: Application Discovery - Evaluating Real Use Cases for In-Office Metal 3D Printing
Tuan TransPham - Desktop Metal
10:00 AM - 11:30 AM

NEW! F20: 3D Printed Tools for Additive Manufacturing Environments
Metal AM Technology - The Fastest Way to Make the Hardest Parts
Alex Huckstepp - Digital Alloys
3D Printed Tools for Manufacturing Environments
Chris Haid - Cincinnati Inc.
12:00 PM - 1:30 PM

NEW! F30: The Ultimate Guide to Metal Additive: Mapping the Process from Discovery to Production
Hallee Deutchman - Fast Radius
2:00 PM - 3:30 PM

NEW! F40: Metal 3D Printing for Fabrication Shops
Metal 3D Printing: Process Validation for High-Requirement Applications
Eric Utley - Protolabs
How Metal 3D Printing Helped Manufacture Unique Look of Seattle High-Rise
Cullen Hilkene - 3Diligent

TUESDAY, NOVEMBER 12
10:00 AM - 11:30 AM
F60: Fundamentals of Additive Manufacturing
Carl Dekker - Met-L-Flo Inc.
12:00 PM - 1:30 PM

NEW! F70: Small & Large Format Printers for Additive Manufacturing
Using a Small Format 3D Printer to Improve Your Fabrication Operation
Mark Watson - Cincinnati Inc.
How Large-Format 3D Printing Is Transforming Industries
Frank Marangell - BigRep

2:00 PM - 3:30 PM
NEW! F80: How Additive Manufacturing Can Accelerate and Advance Your Design
Applying the Agility of Software Development to Hardware
Megan Brewster - Launch Forth
Case Study - How AM Can Accelerate and Advance Your Design
Carl Dekker - Met-L-Flo Inc.

WEDNESDAY, NOVEMBER 13
8:00 AM - 9:30 AM
NEW! F90: The ROI of 3D Printing: Analyze the Cost of Implementing 3D Printing for Your Business
Jaime Howard - Ultimaker
10:00 AM - 11:30 AM
NEW! F100: Impact and Quality Considerations for Additive Manufacturing
Using RE to Enable and Support Additive Manufacturing
Carl Dekker - Met-L-Flo Inc.
Effect of Thermal Gradients on Micro-Structure & Mechanical Properties During AM of Ti-6Al-4V Using Directed Energy Disposition
Yashwanth Kumar Bandari - Oak Ridge National Laboratory
12:00 PM - 1:30 PM
F110: Lasers and Additive Manufacturing Processes
High Power Diode Lasers in Additive and Hybrid Manufacturing
Oleg Raykis - Laserline Inc.
The Additive Process Chain with Laser Metal Fusion
Michael Shaffer - TRUMPF Inc.
2:00 PM - 3:30 PM
NEW! F120: Safely Adopting Additive Manufacturing on the Production Floor
Case Study - How to Embrace AM (3D Printing) on the Production Floor
Carl Dekker - Met-L-Flo Inc.
The Great Unknown: Health Hazards of Additive Manufacturing
Frank Cea - RoboVent
THURSDAY, NOVEMBER 14
8:00 AM – 9:30 AM

**NEW! F130: How MES Transfers Data Efficiently Through the Additive Manufacturing Value Chain & Business Case Method**

*How MES Transfers Data Efficiently Through the AM Value Chain*
William Cuervo - 3YOURMIND

*Discussing Different Methods of AM Business Case Evaluation*
Alexandre Donnadieu - 3YOURMII
MONDAY, NOVEMBER 11
8:00 AM – 9:30 AM
NEW! F11: Move to the 21st Century: The Pro's and Con's of Adding Automation to Your Process
Jeff Tyl - Murata Machinery USA - Muratec

10:00 AM – 11:30 AM
F21: Getting Started with Robotics: A Journey to the World of Robotics
Bob Rochelle - Gudel Inc.

12:00 PM – 1:30 PM
NEW! F31: Leading and Preparing an Industry 4.0 Ready Workforce
Preparation and Industry 4.0 Organization & Workforce
Jeannine Kunz - Tooling U-SME

Leading an Industry 4.0 Organization:
Empowering a Cultural Revolution in the Industrial Revolution
Will Healy III - Balluff, Inc.

2:00 PM – 3:30 PM
NEW! F41: Industrial Internet of Things (IIoT) for the Job Shop
4 Reasons Why Automation Reduces Wastewater Operational Costs
Chris Dooley and Mark Masters - DMP Corp.

Industrial Internet of Things (IIoT) for the Job Shop Fabricator
Will Healy III - Balluff, Inc.

TUESDAY, NOVEMBER 12
10:00 AM – 11:30 AM
NEW! F61: Estimating and Job Costing for Industry 4.0 - The Science of Costing and the Art of Pricing
David Lechleitner - Ultra Consultants and Jason Ray - Paperless Parts, Inc.

12:00 PM – 1:30 PM
NEW! F71: The Full Potential of Automation and Lights-Out!
Tapping the Full Potential of Industrial Robots
Jim Berge - Berge Robotics

Running Your Fabrication Shop Lights-Out
Michael Schlagenhauer - Acuity

2:00 PM – 3:30 PM
NEW! F81: IIoT Solutions to Better Manage Your Assets
Wired vs. Wireless for IIoT Solutions: The Pros, Cons and Key Considerations
Will Zell - Nikola Labs

How IO-Link Is Revolutionizing Industrial Automation
Will Healy III - Balluff, Inc.

WEDNESDAY, NOVEMBER 13
8:00 AM – 9:30 AM
NEW! F91: Effective Automation for Joining in Emerging Technologies
Weld Cells Modulation and Automation for 1-2-Weeks Typical Delivery
John Babb - Robotic Automation

Effective Welding Automation and Emerging Technologies for Heavy Fabrication
Michael Bell - Pemamek LLC

10:00 AM – 11:30 AM
NEW! F101: Integrating Robotic Automation into Your Process
Autonomous Mobile Robots in Diverse Work Settings
Denise Ebenhoech - KUKA

Adapt Your Manufacturing Process: Do More with Less
Mark Sumner - Acieta

12:00 PM – 1:30 PM
NEW! F111: Which Robot Application is Right for Your Needs?
The Benefits of Using Multi-Arm Robotic Applications
Terry Tupper - Fanuc America Corp.

Robotizing Abrasive Processes
Nathan Herbst - 3M

Using the 6 Stages of Human-Robot Collaboration to Find the Right Robot for Your Application
Simon Whitton - KUKA

2:00 PM – 3:30 PM
NEW! F121: Automating the Material Handling Process - Why Now is the Time
Troy Wilson - Cincinatti Inc.
**THURSDAY, NOVEMBER 14**

8:00 AM - 9:30 AM

**NEW! F131: Sensors, Maintenance and Platforms for Leveraging Technology**

Before Your ‘Machine Whisperers’ Retire: Enable Sensors to Tell the Story
Will Zell - Nikola Labs

Leveraging Technology Platforms to Solve Common Supply Chain Issues in the Metal Industry
Jon Haley - Reibus International

IoT Strategies to Drive Robotic Predictive Maintenance
Wesley Mershon - KUKA

**MONDAY, NOVEMBER 11**

10:00 AM – 11:30 AM

**NEW! F22: Cutting for Advanced Materials**

Steel Kirigami: Exploring Structures Through Advanced Manufacturing
Emily Baker - University of Arkansas

Laser Cutting with High Power Ring-Mode Beams in Combination with a Large-Scale Zoom Functionality
Nico Baumbach - II-VI HIGHYAG

**2:00 PM – 3:30 PM**

**NEW! F42: Automated Processes in Hybrid Induction & Oxy-Fuel Cutting**

Hybrid Induction Cutting of Metal at Very High Speed on the Factory Floor or Using Mobile or Portable Robotics Outdoors
Jerry Jones - EnergynTech, Inc.

Oxy-Fuel Cutting & What Is Required for a Fully Automated Process
Kurt Nachbargauer - IHT Automation GmbH & Co. KG

**TUESDAY, NOVEMBER 12**

10:00 AM - 11:30 AM

**F62: Optimization of Cutting Metals with Fiber and Plasma Machining**

Optimization of Sheet Metal Cutting with a High Power, Variable Mode Fiber Laser
Daniel Capostagno - SPI Lasers

10 Ways to Increase Your Plate Steel Utilization and Decrease Your Costs
Derek Weston - Hypertherm Inc.

How to Optimize Results When Cutting Stainless Steel with High-End Plasma
Phillip Parker and John Peters - Hypertherm Inc.

**2:00 PM – 4:00 PM**

**F82: Comparative Cutting Innovations with Tech Tour**

Laser Cutting
Speaker TBD - MC Machinery Systems, Inc.

Waterjet Cutting
David Dumas - Hypertherm Inc.

Plasma Cutting
Jim Colt - Hypertherm Inc.

**WEDNESDAY, NOVEMBER 13**

10:00 AM – 11:30 AM

**F102: Advantages of Waterjet Cutting Machining Technology**

Advantages of Waterjet Technology: Versatility, Efficiency, and Productivity
Brian Sherick - Flow International Corp.

Abrasive Waterjet as a Complementary Machining Process
Vlad Bucur and Jeffrey Anheier - OMAX Corp.

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**FABTECH BISTRO**

Reserve a seat at the FABTECH Bistro and you will always have a convenient place to eat, meet and network.

The Bistro offers assorted menu options including fresh and healthy lunch options, all at a reasonable price.

Pre-purchase your individual lunch tickets to avoid the lines. Find the daily menu, pricing and order tickets at fabtechbistro.com.

Visit fabtechexpo.com/edu for complete session descriptions.
MONDAY, NOVEMBER 11
10:00 AM - 11:30 AM
C20: ABCs of Infrared

NEW! C21: I Want to Powder Coat, Now What?

NEW! C22: Corrosion Basics and Prevention
Terry Giles - Henkel Corp. and Andrea Gray - PPG Industrial Coatings

2:00 PM – 3:30 PM
NEW! C40: It’s Your Money - Control Your Costs
Pretreatment Cost Savings & Increase Profits, Quality and System Efficiency
Tomasz Slezak - BASF/Chemetall
Masking, the Key to Quick Cost Savings
Christopher Malone - Caplugs
Hook and Rack Cleanliness and Its Impact on Transfer Efficiency and Film Build Uniformity
James Malloy - Kolene Corp.

C41: Powder Coating Basics

NEW! C42: Understanding the Basics of Pretreatment
Improving or Changing My Pretreatment for Best Performance
Sergio Mancini - Bulk Chemicals, Inc.
Pretreatment Considerations for Process Changes
Kirk Beaster - BASF/Chemetall
Practical Control of Pretreatment Baths
William Giebel and Terry Sjostrom - Henkel Corp.

TUESDAY, NOVEMBER 12
8:00 AM - 9:30 AM
NEW! C50: Lean and Green Cleaning
Parts Cleaning - Go Lean & Green with New Technology!
Joe McChesney - KYZEN

NEW! C51: Powder System Design for Success
Powder System Design Success
Bill Oney - Therma-Tron-X

NEW! C52: 1K, 2K, New K and Fluid Delivery Methods
1K, 2K, New K
Dan Szczepanik - The Sherwin Williams Co.
Fluid Handling Methods & Energy Savings and Fluid Safety
Martin Powell - Carlisle Fluid Technologies

10:00 AM - 11:30 AM
NEW! C60: Mother Earth Still Needs Our Help!
Removal of Oils/Soils from Industrial Wastewater & Recycling Aqueous Cleaning Solutions
Raymond Graffia - Arbortech Corp.
Water Issues: Quality, Costs, Compliance and Resource Recovery by the Numbers
Jeff Watson - Manufacturing Infrastructure Solutions, LLC

NEW! C61: How It’s Made: Knowing Where Your Powder and Equipment Come From

NEW! C62: Oven Selection Solved
Restricting the Limitations of Traditional Thermal Systems for Finishing Processes
Lee McWhorter - Heraeus Noblelight America LLC
Rebuilding vs. Replacing an Industrial Oven
John Hober - Precision Quincy Ovens, LLC

2:00 PM – 3:30 PM
C80: Identifying and Solving Finishing Defects: See It, Touch It, Fix It
David Schimpff - DuBois Chemicals and Tabitha McLeish - The Sherwin Williams Co.
C81: Lean and Mean - Making Powder Systems Work
Lean Improvements in Powder Coatings
Marty Sawyer - Trimac Industrial Systems
Management of Powder in My Process, Why Should I Care About It?
Jeffrey Hale - Gema USA Inc.

C82: Make Safety a Priority
How Codes Affect Your Spray Booth Design
Robert Hauck - Spray Systems
PPE Options for Coating
Nicholas Liberto - Powder Coating Consultants

WEDNESDAY, NOVEMBER 13
8:00 AM – 9:30 AM
C90: Architectural Coatings - Today and Future
Michael Withers and Manuel Mayer - Axalta Coating Systems and Ben Mitchell - Dura Coat Products

C91: Optimizing Powder Operations
Suresh Patel - BASF/Chemetall, John Cole - Parker Engineering of America and John Sudges - Midwest Finishing Systems, Inc.

NEW! C92: Creative Finishing Solutions
Digital Transformation in Abrasive Blasting
Joe Craig - Blast Services Inc.
Incorporating Magnetic Inserts into Masking for Powder Coating
Cliff Shephard - Echo Engineering and Production Supplies, Inc.
Sanding and Polishing Robot Applications
Michael Elberson - Autoquip Automation
10:00 AM – 11:30 AM
NEW! C100: Conveying Effectively
Conveyor Lubrication, Cleaning and Wear Monitoring
Rolly Wolford - Mighty Lube
Chain-On-Edge Systems for Liquid Paint or Powder Coating
Martin Powell - Carlisle Fluid Technologies

NEW! C101: Mastering Batch Powder Coating Operations
Manual Batch Powder Systems: What You Need to Know to Be Successful
NEW! C102: Choose Your Weapon - Finding the Right Liquid Applicator
Are Electrostatics Beneficial to My Liquid Paint Line?
Bryan Parker - Nordson Corp.

Benefiting from Non-Electrostatic Liquid Applicators
Diego Bertolo - SAMES KREMLIN Inc.
2:00 PM – 3:30 PM
NEW! C120: Quality Still Counts
Understanding and Utilizing LED Technology to Best Light Your Booth
Nirce Boss - LDPI Inc.
Quality Control for Pretreatment Processes
Ken Kaluzny - Coral Chemical Company
What Is Quality Control?
Michael Wittenhagen - TCI Powder Coatings

NEW! C121: Powder Coating Troubleshooting
Advanced Powder Coating: Troubleshooting and Problem Solution
Martin Korecky - AkzoNobel Coatings, Inc.
NEW! C122: Automation Roadmap for Liquid Finishing Operations
William Heuer, Aaron Elliott and Alex Jones - Graco, Barton Faylor - FANUC America Corp., and Dominic Zerilli - Therica Equipment Corp.

THURSDAY, NOVEMBER 14
8:00 AM – 9:30 AM
NEW! C130: Power Up and Hang On for Efficiency and Savings
Hang Methods, Hook/Rack Cleaning and Line Density
Dan Nesper - Dubois Chemicals - American Finishing Resources
Why is Ground So Important to Powder Coating Success...AKA Ground Ad Nauseam
John Cole - Parker Engineering of America
What to Do When Your Powder Coating Line Sounds Like an Episode from Star Trek
Jeffrey Hale - Gema USA Inc.

NEW! C131: Using the Dirty Dozen to Optimize Your Powder Coating
Stephen Houston - Vitracoat Powder Coatings
C132: Test for the Best - Best Practices and Measurement Methods for Quality
Measurement - Nanoindentation and Load Scratch
Rahul Nai - Fischer Technology Inc.
Best Practices and Methods for Testing Organically Coated Products
Nicholas Liberto - Powder Coating Consultants

Visit fabtechexpo.com/edu for complete session descriptions.
**MONDAY, NOVEMBER 11**

8:00 AM - 9:30 AM

F13: **Press Brake for Engineers**
Steve Benson - Asma LLC

F14: **Coil Processing: Slitting HSS Materials**
Al Zelt - ASKO Inc.

F23: **Machine Safeguarding**
Roger Harrison - Rockford Systems, LLC

F24: **Roll Forming: Basics and Lubricants**
Roll Forming Basics
Brian Rodgers - Formtek, Inc.

Modern Lubricants for Roll Form Processes
David Kinnard - Tower Metalworking Fluids

10:00 AM - 11:30 AM

F33: **Material Handling**
How to Keep Full Traceability of Parts (Material, Workcenter and Operator) While Minimizing Hi-Lo Moves (Container Movement)
Jeffrey Sawka - AIM Computer Solutions, Inc.

New Machine Concepts with Fully Integrated Robots Revolutionize Manufacturing Technologies
Christopher Roehm - WAFIOS AG / WAFIOS Machinery Corporation

F34: **Roll Forming: Tooling and Trouble Shooting**
Steve Ebel and Travis Ebel - Roll Form Solutions Inc.

12:00 PM - 1:30 PM

NEW! F43: **Advanced Press Brake Technologies**
High-Mix Low-Volume Bending Technologies
Scott Ottens - Amada America Inc.

Justifying Modern Press Brake Technologies
Paul LeTang - Bystronic Inc.

Latest Advancements in Press Brake Guarding
Tony Caruso - ISB / MERLIN

F44: **Advanced Solutions for Tube and Pipe**
Advanced Cutting Solutions for Scrap Reduction and Improved Efficiency in Tube and Pipe Production
Christopher Murray - Thermatool

**TUESDAY, NOVEMBER 12**

10:00 AM - 11:30 AM

F63: **Effective Safeguarding Risk Assessment**
Douglas Raff - Paragon Industrial Controls Inc.
Brian Roberts - CNA Insurance

F64: **Coil Processing: Blanking Techniques and Handling Solutions**
Laser Blanking from Coil
Jay Finn - Laser Coil Technologies, LLC.

Maximizing Profit by Applying Safe, Efficient “Green” Solutions for Coil Handling and Storage
Michael Baach - Philpott Rubber & Plastics

12:00 PM - 1:30 PM

NEW! F73: **Dust Collection for Fabrication Processes**
Ambient and Source Capture Dust Collection Systems
Jeremiah Wann - Imperial Systems Inc.

Combustible Dust - An Explosive Situation
Frank Cea - RoboVent

NEW! F74: **Roll Forming: Design and Welding Techniques**
Rollforming Solutions - Functional, Lightweight, and Freedom in Design
Bill Johnson - Welser Inc.

Welding Roll Formed Profiles - Select the Right Welding Method
Jack Pennuto - TRUMPF Laser Technology

2:00 PM - 3:30 PM

F83: **Sheet Metal Design and Press Brake Automation**
Cost Reduction Through Innovative Sheet Metal Design
Grant Hagedorn - TRUMPF Inc.

Automated Press Brake Forming
Andrew Jeffrey - TRUMPF Inc.

F84: **Roll Forming: Justification and In-Line Punching, Cutoff Dies**
Justification for Roll Forming
Brian Rodgers - Formtek, Inc.

Increasing Value to Your Rollforming Lines with In-line Punching and Cutoff Dies
Paul Williams - Hill Engineering / Formtek, Inc.
WEDNESDAY, NOVEMBER 13
8:00 AM – 9:30 AM

NEW! F93: A Modular Approach to Turning Non-Value Added Time on a Press Brake into Productive Time
David Bishop - Wila USA

F94: Roll Forming: Press Tonnage Rating and Welding Systems
Advanced Roll Forming Techniques
Brian Rodgers - Formtek, Inc.

When the Press Tonnage Rating Is Really Not That Tonnage
Paul Williams - Hill Engineering/Formtek, Inc.

10:00 AM – 11:30 AM

F103: Press Brake Safety
Douglas Raff - Paragon Industrial Controls Inc.

F104: Tube & Pipe Lubricants, Bending and Case Studies in Tube Field Failures
Modern Tube Bending Machinery
Greg Miller - Tubular Solutions Inc.

Field Failures in Tubing, Case Studies, Corrosion Resistant Alloys
David O'Donnell - RathGibson

Selecting the Right Lubricant for the Tube Material - Tube Forming & Mandrel Bending
Christopher Fletcher - Tower Metalworking Fluids

12:00 PM – 1:30 PM

NEW! F113: Alternative Forming Processes
Sheet Hydroforming as a More Economical Process for Prototype Tool Design and Low Volume Production
Randy Kish - Quintus Technologies

Artificial Intelligence for Roll Bending
Greg Hoesly - Boschert USA and Gregory Conraud - AMB Picot

2:00 PM – 3:30 PM

NEW! F114: Alternative Techniques for Annealing, Testing and Grinding Abrasives
On-Site Generated Hydrogen May Offer Lower Costs and Green Benefits for Annealing
David Wolff - Nel Hydrogen

Magnetic Structurescopy (Coercimetry) for Quality Assessment in Metallurgy and Metalwork Manufacturing
Roman Solomakha and Svitlana Savluk - CM Diagnostics

Bonded Abrasive Technology: Reducing Labor Costs by Adding Comfort
Marc Brunet Gagné - Walter Surface Technologies

NEW! F123: Press Brake Hurdles
Lowering the Hurdles in the Press Brake Department
Larry Boden - Mate Precision Tooling

Understanding Press Brake Crowning
Todd Kirchoff - Cincinnati Inc.

F124: Coil Processing: Slitting Thin Materials, Leveling & Deburring
Processing and Slitting Thin, Ultra Thin and Surface Critical Material: Copper, Brass, Stainless, Tin Plate or Aluminum
Mike McGuire - Burghardt + Schmidt GmbH

Leveling & Deburring: Modern Metal Processing
Nicholas Miller - ARKU, Inc.

Visit fabtechexpo.com/edu for complete session descriptions.
MONDAY, NOVEMBER 11
10:00 AM – 11:30 AM

**NEW! F25: Lasers for Joining Development and Control**
Full Digital Controlled Robotic Hybrid Laser and Arc System
Michael Sharpe - FANUC America Corp. and Kyle Smith - Lincoln Electric
Introducing CleanWeld: A New Approach to High Power Fiber Laser Welding
Jean-Philippe Lavoie - Coherent

12:00 PM – 1:30 PM

**NEW! F35: Remote Laser Joining & Interface Applications**
Compact Remote Welding with Robotic Servo Motor Controlled Laser Beam Welding
Michael Sharpe - FANUC America Corp.
Remote Laser Welding with Omni-Directional Seam Tracking
Matthias Kühnel - II-VI HIGHYAG
Modular Remote Laser Welding Head Combined with a Consistent Interface Standardization Provides Flexible Application Possibilities in Production
Jay Flowers - Abicor Binzel

2:00 PM – 3:30 PM

**F45: Lasers and Laser Systems for Advanced Manufacturing**
Lasers and Laser Systems for Advanced Manufacturing in Welding
Mark Boyle - Amada Miyachi America, Inc.
Industrial Manufacturing with Diode Lasers
Oleg Raykis - Laserline Inc.
Fiber Laser Cutting, Fundamentals and Beyond
Rouzbeh Sarrafi - IPG Photonics

WEDNESDAY, NOVEMBER 13
8:00 AM – 12:30 PM

**AWF100: Laser Welding Workshop**
Discover the latest real-world techniques and applications from our FABTECH laser experts. This workshop will cover: what’s new, laser system overview and sources, design considerations, additive and hybrid laser welding, followed by an application discussion with expert speakers.
Essential Considerations for Laser Welding - From Component Design to Implementation
David Havrilla - TRUMPF Inc.
Introduction to Industrial Laser Welding
Tom Kugler - Laser Mechanisms, Inc.
Laser Sources for Industrial Laser Welding: Fiber, Disk and Diode
Jean-Philippe Lavoie - Coherent Inc.
What’s New in Laser Welding
Geoff Shannon - Coherent Inc.
System Overview for Automated Laser Welding in Production with Examples for Welding Automotive Seat Components and Tailor Welded Blanks
David Guastaferri - Lincoln Electric Automation
Hybrid Laser Welding
Paul Denney - IPG Photonics
Laser Welding and Additive Technologies
Wayne Penn - Alabama Laser
NEW! F115: The Use of Additive and Subtractive Lasers in Applications for Custom Parts
Jon Carlson - GF Machining Solutions

LEARN

MONDAY, NOVEMBER 11

8:00 AM - 9:30 AM

F16: Lean Principle: Getting Started with Your Lean Journey
Jeff Sipes - Back2Basics, LLC

10:00 AM - 11:30 AM

F26: Lean Tools: Flow & Pull in High Variety Environment
Kevin Duggan - Institute for Operational Excellence

12:00 PM - 1:30 PM

NEW! F36: Lean Principle: OEM Quality Excellence: 6 Practical Steps to Becoming and Award-Winning Supplier
Jeff Hohlfedt - Northern Industrial Manufacturing and Steve Bieszczat - IQMS

2:00 PM - 3:30 PM

F46: Lean Principle: Strategic Planning and Hoshin Kanri - How to Achieve the Future You See
Anthony Manos - Profero, Inc.

TUESDAY, NOVEMBER 12

8:00 AM - 9:30 AM

NEW! F56: Lean Principle: Leadership and The Lean Journey
Jeff Sipes - Back2Basics, LLC

10:00 AM - 11:30 AM

F66: Lean Tools: VSM - Addressing Differences Between the Office and Shop Floor
Mike Osterling - Osterling Consulting, Inc.

12:00 PM - 1:30 PM

F76: Lean Tools: A3 Thinking - Developing People & Solving Problems
Mike Osterling - Osterling Consulting, Inc.

2:00 PM - 3:30 PM

F86: Lean Tools: Standard Work for Quality and Improvement
Anthony Manos - Profero, Inc.

WEDNESDAY, NOVEMBER 13

8:00 AM - 9:30 AM

NEW! F96: Lean Principle: Go to Gemba
Jeff Sipes - Back2Basics, LLC

10:00 AM - 11:30 AM

NEW! F106: Lean Tools: Lean Production Shop to a Job Shop
Rich Steel Jr. - Miller Fabrication Solutions

THURSDAY, NOVEMBER 14

8:00 AM - 9:30 AM

NEW! F136: Lean Principle: Science of Lean Culture and Case Studies
Science Behind Culture in a Lean Transformation
Brett Polglaze and Joseph Girard - Wipfli CPAs and Consultants

Lean Case Study
Michael Schlagenhaufer - Acuity

Visit fabtechexpo.com/edu for complete session descriptions.
**MONDAY, NOVEMBER 11**

**8:00 AM - 9:30 AM**

**NEW! F17:** Choosing the Best Source of Growth Capital for Your Manufacturing Business
- Paul Liles - CIBC

**10:00 AM - 11:30 AM**

**NEW! F27:** Planning for the Present & Paving a Strategic Roadmap
- Planning for the Future? What About the Present?
  - Bridget Lazlo - Guardian Business Solutions
- Paving a Strategic ROADMAP™ to Success: Overcoming the Challenge of Developing a Simple, Clear and Effective Business Strategy
  - Andy Shafer - Shafer’s Innovation and Business Building Services

**12:00 PM - 1:30 PM**

**F37:** Job Shop Costing, Estimating and Scheduling for Complex Jobs
- Job Shop Costing and Estimating
  - Don Clutter - MIE Solutions
- Unique Benefits of Finite Capacity Scheduling for Complex Job Shops
  - Prasad Velaga - Optisol

**TUESDAY, NOVEMBER 12**

**8:00 AM - 9:30 AM**

**F57:** Building A Competitive Advantage: Know What Your Business is Worth and Tax Credit Advantages
- Building a Competitive Advantage Through R&D Tax Credits
  - John Madsen - Black Line Group
- Do You Know What Your Manufacturing or Metal Fab Business Is Worth?
  - Matthew Bradbury - Business Acquisition & Merger Associates

**WEDNESDAY, NOVEMBER 13**

**8:00 AM - 9:30 AM**

**NEW! F97:** Ensuring Tomorrow: How to Effectively Choose and Prepare Your Successor
- Michael Beck - Eliciting Excellence

**10:00 AM - 11:30 AM**

**NEW! F107:** Win the Inner Game: Free Yourself of Overwhelm and See Your Highest Potential Come True
- Pete Winiarski - Win Enterprises, LLC

**12:00 PM - 1:30 PM**

**NEW! F117:** Diagnose Your Business: How to Free Yourself from Budget Limitations by Finding and Unlocking Hidden Money in Your Operations
- David Tweedt - Win Enterprises, LLC

**2:00 PM - 3:30 PM**

**F127:** Enable the Transition to Next Gen - Family Business
- Henry Hutcheson - Family Business USA
THURSDAY, NOVEMBER 14

8:00 AM – 9:30 AM

NEW! F137: Making Better Decisions as a Business Leader & Tools for Management Success

Making Better Decisions as a Business Leader
Dan Ryan - Ryan Search & Consulting

Decision Making Tools for Management
Larry Burks - West Chester Township

10:00 AM – 11:30 AM

NEW! F147: Financing to Enable Growth & Achieve Project Improvements

How to Use Financing to Support & Enable Growth in a Manufacturing Business
David Goose and Chris Richardson - Manufacturers Capital

GOAL: Achieving Your Most-Rewarding New/Renovated Plant or Process Improvement Project
G Robert Sipp - TecTrans
MONDAY, NOVEMBER 11
8:00 AM – 9:30 AM

**NEW! F18: Supercharge Your Networking & Inbound Marketing**
Create Opportunities by Better Networking
Kenneth Mall and Chuck Mouranie - EDSI

Maximizing Your Trade Show Investment: A Defined Process for Pre-Show Marketing, Lead Follow-Up, Tracking, and Measuring ROI
Josh Curcio - protocol 80, Inc.

**10:00 AM – 11:30 AM**

**NEW! F28: Your Schematic for Assembling a Powerful Digital Marketing Machine**
Stoney deGeyter - The Karcher Group

12:00 PM – 1:30 PM

**NEW! F38: Build a Sales Strategy & Model for Scalable Growth**
How to Get 20% of Your Reps’ Time If You Are Only 10% of Their Income
Charles Cohon - Manufacturers’ Agents National Association

Sales Model for Scalable Growth
Michele Nichols - Launch Team, Inc.

Modern Sales Strategies to Reach Business Goals
Patricia Cisco - Marketing Essentials

**NEW! F48: Deliver Superb Customer Service & Build a Customer-Centric Culture**
6 Ways to Build a Customer-Centric Culture
Andrea Olson - Pragmadik

Deviate from the Process to Deliver Superb Customer Service
Holly O’Donnell - Slone Solutions, LLC

WEDNESDAY, NOVEMBER 13
8:00 AM – 9:30 AM

**NEW! F98: Digital Recruiting Strategies & Data for Continuous Improvement**
Digital Recruiting Strategies for Attracting Today’s Modern Manufacturing Talent
Patricia Cisco - Marketing Essentials

Digital Marketing for Contract Fabricators/How to Use Data for Continuous Improvement
Tim Doyle - TopSpot

**10:00 AM – 11:30 AM**

**F108: Business Builders: Make Business Development a Competitive Advantage**
Mark Frasco - COACT Associates, Ltd.

**12:00 PM – 1:30 PM**

**NEW! F118: Protecting Original Design: The Importance of IP For Fabricators**
Protecting Original Design: The Importance of IP for Fabricators
David Adler - Adler Law Group

Patent Rights in Metal Forming
Marshall Honeyman - Erise IP

**2:00 PM – 3:30 PM**

**NEW! F128: A Marketing Framework: From Lead to Sale - Marketing Tools & Tips for Fabricators and OEMs**
From Lead to Sale - Marketing Tools & Tips for Fabricators & OEMs
Andrew Garman - Pipedream Marketing

A Proven Framework for Effectively Marketing to Engineers Along the Buyer’s Journey
Dan Konstantinovsky - RH Blake
LESS LABOR MORE THROUGHPUT

NEW! AUTOMATED PART PALLETIZING

#SeeToBelieve
FABTECH BOOTH A2923

MITSUBISHI LASER
MONDAY, NOVEMBER 11

8:00 AM – 9:30 AM

NEW! F19: Current State of Smart Manufacturing & The Connected Viewpoint
Smart Manufacturing Driven by Smart Technology: What’s the Current State?
Jeff Car - Ultra Consultants

The Connected Viewpoint: The New Era of Data for Industry 4.0
Paul Außerer - Marquis Data

10:00 AM – 11:30 AM

NEW! F29: Smart Manufacturing Basics to Get Started in the Digital World
Smart Factory: 101
Adria Haines - Lantek Systems, Inc.

Smart Manufacturing: Why Should I Care? Where Do I Start?
Will Healy III - Balluff, Inc.

Power Your Digital Transformation with a Connected Enterprise (IoT)
Christine Hansen - Epicor Software Corp.

12:00 PM – 1:30 PM

F39: Industrial IoT Case Study - Real World Implementation
Jonathan Kim, Casey Greer, Willie Pramono and Eric Trexler - Amada America Inc.

2:00 PM – 3:30 PM

NEW! F49: Smart Manufacturing and Workforce Ready!
Scale Your Workforce Training Using Virtual Reality
Dave Beck - Foundry 45

Smart Manufacturing Meets Workforce Development
David Iyoha - Lantek Systems, Inc.

TUESDAY, NOVEMBER 12

8:00 AM – 9:30 AM

NEW! F59: Productivity, Performance & Quality Management for Smart Manufacturing
Make the Transition to 100% PMI Without Adding a Significant Cost to Your Business
Jordan Rose - Hitachi High-Tech Analytical Science

Shop Floor Optics: Illuminate Your Hidden Improvement Potential with IIoT Machine Learning and Performance Technology
Mark Stevens and Jake Rohrer - Wipfli CPAs and Consultants

10:00 AM – 11:30 AM

NEW! F69: Quit Making Excuses and Close the Loop - Now is the Time to Digitize
Quit Making Excuses. Now is the Time to Digitize
Kevin Must - Lantek Systems, Inc.

Closing the Loop - How Digital Technology Can Play a Transformative Role in Enabling Intelligent Manufacturing Systems
Tyler Vizek - MxD

12:00 PM – 1:30 PM

NEW! F79: From Rust-Belt to High-Tech: Transform, Ignite and Disrupt
Steve Blue - Miller Ingenuity

2:00 PM – 3:30 PM

NEW! F89: Artificial Intelligence for Machine Learning & Streamlining Quoting Process
Applying Artificial Intelligence and Machine Learning to Metal Shop Processes
Richard Boyd - Tanjo Inc.

Streamline Your Quoting Process with Artificial Intelligence
Kevin Must - Lantek Systems, Inc.
WEDNESDAY, NOVEMBER 13

8:00 AM – 9:30 AM

NEW! F99: The Smart Factory & Feasibility with Case Studies
The Story of a Smart Factory
Ryan Zimmerman and Kyle O’Reilly - VKS - Visual Knowledge Share

Smart Manufacturing Feasibility Case Study
David Iyoha - Lantek Systems, Inc.

10:00 AM – 11:30 AM

Isaac Bennett - Detroit Manufacturing Systems (DMS) and Mohamed Abuali - IoTco

NEW! F119: Prevent Digital Failure and Benchmark Your Performance
People and Process Actions to Prevent Digital Transformation Failure
Paul Vragel - 4aBetterBusiness, Inc.

Benchmarking Performance: Where Do You Stand vs. Your Competition?
Lou Zheng - MachineMetrics

2:00 PM – 3:30 PM

NEW! F129: Smart Manufacturing on Predictable ROI
Manufacturing Mysteries: How the Best Always Seem to Know the Answers Ahead of Time
Unlocking New Business Models With Industrial Apps & Software
Simone Gianotti - Schneider Electric

THURSDAY, NOVEMBER 14

8:00 AM – 9:30 AM

NEW! F139: Smart Manufacturing to Successfully Implement the Trifecta; All in Real Time
Paul Hogendoorn - FreePoint Technologies
STAMPING

MONDAY, NOVEMBER 11
10:00 AM – 11:30 AM
NEW! S20: Understanding Servo Metal Stamping Presses - Proper Usage, Troubleshooting and Maintenance
Jeffery Fredline - MECO Corporation

S21: Lubricants - 1
LUBRI-NOMICS - The Science of Lubrication and Economics in Metal Stamping
Bob Anderson - Tower Metalworking Fluids

12:00 PM – 1:30 PM
S30: ANSI Z224.1 & OSHA 1910.147 Applications of Alternative Methods for Hazardous Energy Control
Ted Sberna - White Horse Safety Inc.

2:00 PM – 3:30 PM
NEW! S40: Application of Real-Time Visual Monitoring Tool in Stamping
Hyunok Kim - EWI and Michael Selent - SelmaTec Systems GmbH

NEW! S41: Lubricants - 2
Chlorinated Metal Working Fluids- Fact, Fiction & Options
Bob Anderson - Tower Metalworking Fluids
Avoiding Oil Mist Mishaps
Frank Cea - RoboVent

TUESDAY, NOVEMBER 12
8:00 AM – 9:30 AM
NEW! S50: Materials - 1
Utilizing Advanced Materials and Joining Technologies to Lightweight Current and Future Mobility Solutions
Stephen Rawe - Martinrea International Inc.
Tensile Tests, Metal Certs and Simulation
Daniel Schaeffler - Engineering Quality Solutions

NEW! S51: Connectivity - 1
Sensors & Connectivity Improvements for Transfer Die Applications
Will Healy III - Balluff, Inc.
Is ERP an Effective Solution for Die Makers and Metal Fabricators?
Jeanne Naysmith - TST Tooling Software

10:00 AM – 11:30 AM
NEW! S60: Materials - 2
The Effects of Automotive Lightweight-Initiatives on Die Design Strategy and Construction
Peter Ulintz - Precision Metalforming Association and Daniel Schaeffler - Engineering Quality Solutions

NEW! S61: Connectivity - 2
Case Studies of IO-Link Modernizing the Press Shop
Will Healy III - Balluff, Inc.
I-PRESS, the Future of Press Control Technology
Ray Fausz - Sutherland Presses

I-PRESS, the Future of Press Control Technology

WEDNESDAY, NOVEMBER 13
8:00 AM – 9:30 AM
NEW! S90: Stamping - 1
Strengthening Die Maintenance Programs
Peter Ulintz - Precision Metalforming Association

NEW! S91: Sensors - 1
How Die Protection Sensors & Press Setup Technologies Enable Quick Die Changes, Quality Parts & Prevent Die Crashes
Will Healy III - Balluff, Inc.

10:00 AM – 11:30 AM
NEW! S100: Stamping - 2
What’s Holding You Back - How to Optimize Your Press Line and Protect Your Tooling
Rob Meyer - Nidec Minster Corporation

NEW! S101: Sensors - 2
Automatic In-Die Part Quality Monitoring & Tool Adjustments
James Barrett - Link Systems, Inc.
WELDING FABRICATION

MONDAY, NOVEMBER 11
10:00 AM – 11:30 AM
NEW! W200: The Welding Economy
Michael Lang - Fluor
2:00 PM – 3:30 PM
NEW! W400: Robotic Welding for Job Shops
Bryan Peoples - OTC Daihen

TUESDAY, NOVEMBER 12
10:00 AM – 11:30 AM
NEW! W600: Resistance & Arc Welding for Better Weldability and Hazard Reduction
Resistance Spot Welding Coupled with High Frequency Acoustic Waves for Better Weldability of Dissimilar Materials
Umair Shah - The Ohio State University
Electrical Hazard Reduction in Arc Welding
Jim Galloway - Conestoga College
2:00 PM – 3:30 PM
NEW! W800: Improving Lightweight Materials Joining Through Friction Welding
Mike Spodar - Coldwater Machine Company, a Lincoln Electric Company

WEDNESDAY, NOVEMBER 13
10:00 AM – 11:30 AM
NEW! W100: Optimization of Welding Documentation and Continuity Efficiency Using Computer Software
Antonio Howard - CEI

Visit fabtechexpo.com/edu for complete session descriptions.
The HEART of Conflict - Open Heart Mindset for Strong Leaders
Noa Ronen - Noa Ronen Coaching
12:00 PM – 4:30 PM

NEW! F216: Leadership Skills & Development Workshop
This workshop is ideal for all leaders, supervisors, managers, team leaders and project managers. Topics will enable new skills and valuable information to implement immediately for current or upcoming leaders. The workshop provides specific topics for strategies to lead effectively through performance management, accountability, engagement & recognition, delegation, crucial conversations, and becoming the learning leader.

How to Have Conversations That Matter in the Workplace
Amir Ghannad - The Ghannad Group, LLC

Delegation Strategies to Help You Be a More Effective Manager
Mark Ernst - Ernst Enterprises

Accountability Through Engagement
Pete Winiarski - Win Enterprises LLC

Engaging and Recognizing Employees
Lisa Ryan - Grategy.com

Be the ‘One’ Manager That Is Respected and Remembered
Mark Ernst - Ernst Enterprises

Learning Leaders Drive Successful Organizations
Joseph Mazzeo - Integrated Lean and Quality Solutions, LLC

NEW! F217: Operational Excellence for Significant and Sustained Performance with Incentive Pay
Creating Operational Excellence with Incentive Pay
Vince Bovino - Bovino Consulting Group

How to Translate the Daily Challenge to the Production Floor and Tie Pay to Achieving It
Charles DeBettignies - Gainsharing Inc.
12:00 PM – 1:30 PM

NEW! F219: Leading Innovation & Change Initiatives in Your Organization
Leading a Change Initiative
Mark Ernst - Ernst Enterprises

Innovative Manufacturing — What Is It and How Do We Teach It?
Sebastian Ceron - Saskatchewan Polytechnic Regina Campus

Wednesday, November 13
8:00 AM – 9:30 AM
NEW! F220: Manage, Mentor and Develop Your New Workforce & Staff for the Future

Helpful Tips on How to Manage, Mentor and Develop Your New Workforce
Marion Wells - Human Asset Management

2:00 PM – 3:30 PM

THURSDAY, NOVEMBER 14
8:00 AM – 9:30 AM

NEW! F221: How to Win with Personalities & Team Engagement

Together We Win
Justin Copie - Innovative Solutions

How Personalities Impact Team Engagement
Holly O’Donnell - Slone Solutions, LLC
SEMINARS

TUESDAY, NOVEMBER 12
8:00 AM - 4:00 PM
W11: APPLIED WELDING METALLURGY
Introduction to basic metallurgy concepts and how they affect the material properties from time of manufacturing through to welding fabrication.
Ben A. Pletcher, Bechtel Global Corporation — Welding and Applied Technology Center

8:00 AM - 12:00 PM
W12: WPS’S FOR WELD INSPECTION AND TEST-TAKING TIPS
Learn about weld geometry, shapes, sizes, terminology, and welding positions. Welding symbols and methods, strategies, and tips for taking and passing technical tests will be discussed.
Ben Taves, AWS Instructor

TUESDAY, NOVEMBER 12 – WEDNESDAY, NOVEMBER 13
8:00 AM - 5:00 PM
W13: AWS EDUCATIONAL OVERVIEW OF WELDING CODES AND STANDARDS
This seminar highlights the significant changes in recent revisions of AWS B2.1, AWS D1.2, AWS D18.1 and ASME Section IX. Industry experts also provide insight into how welding qualification codes ASME Section IX and AWS B2.1 are used in conjunction with ASME construction codes B31.1, B31.3, and Section VIII. Reference standards AWS B1.10, AWS B1.11, AWS A2.4, and AWS A3.0 will also be discussed.

WEDNESDAY, NOVEMBER 13
8:00 AM - 4:00 PM
W14: “WELDING” DON’T BE AFRAID TO ASK
What is “welding,” what does it look like, and how do you do it? These questions and a lot more will be answered, including how and where a person can learn to weld, what are “codes” and why we use them, what is a Certified Welder or Certified Welder Inspector (CWI), and how to become one?
Ben Taves, AWS Instructor

W15: STAINLESS STEEL WELDING D1.6 STRUCTURE
This session will cover the basic types of stainless steel, general welding discontinuities and defects, specific discontinuities and defects in stainless steel welds, and general corrosion issues.
Rich Campbell, Bechtel Global Corporation and AWS Instructor

CONFERENCES

TUESDAY, NOVEMBER 12 – WEDNESDAY, NOVEMBER 13
8:00 AM - 4:00 PM
W16: 5TH INTERNATIONAL ELECTRON BEAM CONFERENCE
We are pleased to announce the first call for abstracts to the 5th International Conference on Electron Beam Welding. The conference, co-sponsored by the American Welding Society, DVS — German Welding Society, and the International Institute of Welding — Commission IV, will bring together scientists and engineers from industry, academia, and research laboratories from around the world to discuss current and future trends in electron beam welding.

RWMA RESISTANCE WELDING SCHOOL

TUESDAY, NOVEMBER 12 – WEDNESDAY, NOVEMBER 13
8:00 AM - 5:00 PM
W22: RWMA RESISTANCE WELDING SCHOOL
The RWMA Resistance Welding School is an intensive two-day course about the basics of resistance welding once a year. The school is designed to give operators, production supervisors, engineers, and others the opportunity to study, better understand, and further their knowledge in the theory, applications, and equipment used in the resistance welding process. This intensive learning atmosphere will better prepare the unfamiliar and further educate the experienced. The first day of this school introduces the processes and machines, materials, electrodes, and power systems associated with resistance welding. The second day covers welding controls, quality standards, machine set-up, and maintenance topics.
CAREER PATH WORKSHOPS

MONDAY, NOVEMBER 11
1:00 PM – 3:00 PM
W17: GETTING STARTED IN UNDERWATER WELDING
Underwater welders work all over the country and even around the world. Come learn from an international industry expert about the opportunities available and the skills you can develop.
Uwe Aschemeier, Subsea Global Solutions and Whitey McDonald, Subsea Global Solutions

W18: CREATING A WPS IN 60 SECONDS
The latest technology tools take the guesswork out of creating WPSs. Learn how to save time and money by creating accurate and prequalified WPSs, or even more specialized welding procedures safely by using technology.
Mike Bernasek, C-Spec and Dustin Brungardt, C-Spec

WEDNESDAY, NOVEMBER 13
9:00 AM – 11:00 AM
W19: DEVELOPMENT OF A NEW STANDARD FOR METAL ADDITIVE MANUFACTURING: AWS D20.1/D20.1M, SPECIFICATION FOR FABRICATION OF METAL COMPONENTS USING ADDITIVE MANUFACTURING
This presentation will provide a discussion of unique challenges involved in the production of metal AM parts, as well as an overview of the AWS D20.1 standard and how this standard addresses these challenges.
Jessica Coughlin, Naval Nuclear Laboratory

THURSDAY, NOVEMBER 14
8:00 AM – 10:00 AM
W20: STARTING A WELDING INSPECTION BUSINESS
What is required legally to go into business for yourself as a consultant? Learn from successful entrepreneurs who made welding inspection work for them.
Brent Boling, ARC-Tech Welding Inspection

8:00 AM – 11:00 AM
W21: BECOMING A CERTIFIED WELDING ACCREDITED TEST FACILITY FOR THE TESTING CW
This course is designed to help you navigate through the process of becoming an AWS Accredited Test Facility.
Emil Pagoaga and Joe Young, American Welding Society

PROFESSIONAL PROGRAMS
Pick and choose between concurrent sessions for the latest in welding research and commercial developments. Pick a day or attend the entire four-day program.

MONDAY, NOVEMBER 11
SESSION 1: ADDITIVE MANUFACTURING I
Session Chairs: P. Hochanadel, Los Alamos National Laboratory and T. Borchers, Arconic Inc.

1:40 PM
Wire-Arc Additive Manufacturing: Multi-Pass Gas-Metal Arc Welding in the Digital Age
G. Knapp, T. Mukherjee and T. DeBroy, The Pennsylvania State University

2:00 PM
Zero Programming Repair Strategy Using Additive Manufacturing
S. Alam, P. F. Mendez and D. R. Ramirez Rebollo, University of Alberta — CCWJ; M. Dewar and S. Borle, Group Six Technologies

2:20 PM
Comparison of Low Heat Input Deposition Methods for Suitability in Wire Arc Additive Manufacturing
J. Ream and S. Liu, Colorado School of Mines

2:40 PM
Formation of Austenite in Duplex Stainless Steels Produced Using Laser-Based Directed Energy Deposition Additive Manufacturing
A. Iams and T. Palmer, The Pennsylvania State University

3:00 PM
Modeling the Effect of Particle Shapes and Hatching Patterns on Solidification Structure in Powder Bed Additive Manufacturing
X. Gao, A. Faria Guillerme, K. Kamal, W. Zhang, R. Antonio, and Y. Wang, The Ohio State University; K. Wheeler, NASA Ames Research Center

3:20 PM
Producing Larger Part Overhangs Using Non-Gravity Aligned Torch Orientations in Large Scale Metals Additive Manufacturing
J. Penney and W. Hamel, University of Tennessee

3:40 PM
Additive Manufacturing of Multi-Material Parts Using the Wire-Arc Process
A. Nycz, M. Noakes, C. Masuo, D. Vaughan, S. Patrick, Oak Ridge National Laboratory; J. Paul and J. Flamm, Wolf Robotics

4:00 PM
Wire-Arc Additive Manufacturing Process Assisted by Magnetic Arc Oscillation
A. Bracarense and D. Corradi, Universidade Federal de Minas Gerais

Visit fabtechexpo.com/edu for complete session descriptions.
4:20 PM
Wire Feed Rate and Arc Length Adaptive Control System in Additive Manufacturing by Double Electrode Micro-Plasma Arc Welding
D. Fan and N. Li, Lanzhou University of Technology

4:40 PM
Wire and Arc Additive Manufacturing Technology of In-Situ Strengthened Functionally Gradient Materials Titanium Alloy and Research of Microstructure and Properties
J. Huang, H. Chen, S. Yu, W. Yuan, W. Pan, and D. Fan, Lanzhou University of Technology

SESSION 2: MODELING
Session Chairs: W. Zhang, The Ohio State University and U. Duman, LAM Research

1:40 PM
Physical Mechanisms Present in the Welding Arc
P. Mendez, University of Alberta; M. Ramirez Argaez, A. Delgado Alvarez, A. Morales Antonio, and A. Velazquez Sanchez, UNAM; D. Apaoblama Chaer, University of Chile

2:00 PM
Computational Modeling of Stress Relief Cracking Test
C. Sarich, B. Alexandrov and A. Benatar, The Ohio State University

2:20 PM
Transport Phenomena-Based Models for Building a Digital Twin for Metal Printing
T. Mukherjee, G. Knapp and T. DebRoy, Pennsylvania State University

2:40 PM
Thermocapillary-Driven Weld Pool Flows in Autogenous Fusion Welding: Scaling Analysis
D. Havrylov and P. Mendez, Canadian Centre for Welding and Joining

3:00 PM
Microstructure Based Creep Fracture Model for Type IV Cracking of Grade 91 Steel Weldment
W. Zhang, Y. Wang and Z. Feng, Oak Ridge National Laboratory

3:20 PM
Practical Considerations for Analytical Modelling of Residual Stress
M. Grams, P.F. Mendez, CCWJ — University of Alberta — CCWJ

3:40 PM
Uncertainty Analysis in Computational Weld Mechanics Based Simulations Due to Input Material Property Data
C. Fisher, D. Bechetti and J. Semple, Naval Surface Warfare Center — Carderock

4:00 PM
Fracture Prediction of AISI Coated Hot Stamped Boron Steels Spot-Welded Joints
Y. Lu, K. Zhang, M. Kimchi, and W. Zhang, The Ohio State University; T. Abke, S. Malcolm and K. Pydimarry, Honda R&D Americas, Inc.

4:20 PM
An improved Prediction of Distortion in Additive Manufacturing by Considering the Repeated Annealing Phenomena of Ti-6Al-4V
G. Shi, Tsinghua University

4:40 PM
Multi-Scale Modeling of Hybrid RSW/FEW: RSW Model Validation and AHSS Microstructural Evolution Modeling
E. Brizes and A. Ramirez, OSU Welding Engineering; H. Ghassemi-Armaki, ArcelorMittal; Tim Abke, Honda R&D Americas Inc

SESSION 3: ARC WELDING
Session Chairs: Y. Yang, Huntington Ingalls Shipbuilding and Nick Kapustka, EWI

1:40 PM
A Novel Method of Triple-Wire Gas Indirect Arc Welding
G. Song, Dalian University of Technology

2:00 PM
Arc Characteristics and Metal Transfer Behavior in Pulsed DE-GMA-Additive Manufacturing
G. Zhang, G. He, Y. Shi, Y. Gu, and D. Fan, Lanzhou University of Technology

2:20 PM
Discharge Process with High Frequency Pulsed Arc Welding
M. Yang, H. Liu and B. Qi, Beijing University of Aeronautics and Astronautics

2:40 PM
Effect of Arc Pressure on Digging Process in Variable Polarity Plasma Arc Welding of A5052P Aluminum Alloy
S. Chen, B. Xu and F. Jiang, Beijing University of Technology

3:00 PM
GTAW Penetration Control Based on Arc Voltage Sensing
R. Yu and Y. Zhang, University of Kentucky; Y. Cheng, Beijing University of Technology

3:20 PM
Study on Bypass-Current Plasma-MIG Hybrid Welding Process of 5083 Aluminum Alloy
Y. Miao, J. Zou, Z. Lin, J. Guo and C. Li, Harbin Engineering University

3:40 PM
Thermal Characteristics of Narrow Gap GMA Welding at Vertical Position with Arc Swinging and Shifting
H. Lan, S. E. and J. Shao, Zhejiang Normal University; H. Zhang, Shanghai Zhenhua Heavy Industries Co Ltd; S. Lin, Harbin Welding Institute

4:00 PM
Influence of Helium Pressure on Low Current GTAW Welding on the Performance of Tungsten Electrodes Classifications
G. Di Gennaro, Coni — Consultoria e Projetos; Sergio Brandi, USP
PROFESSIONAL PROGRAMS

4:20 PM
Effect of Fluorides on the Surface Tension of Molten Pool During GTA Welding Process
C. Li, Y. Shi, Y. Gu, and C. Bian, Lanzhou University of Technology

4:40 PM
Plasma Arc Gradient Functional Material Manufacturing Process Based on Bypass Double Wire
C. Li, Y. Miao, J. Zou, and Z. Lin, Harbin Engineering University College of Shipbuilding Engineering

TUESDAY, NOVEMBER 12

SESSION 4: SOLID-STATE PROCESSES
Session Chairs: W. Tang, Oak Ridge National Laboratory and J. Pfeiffer, PVA TePla — Germany

8:00 AM
Innovative Connectors for Joining Aluminum Alloys
Dr. H. Zhang, The University of Toledo

8:20 AM
Applying Torque Based Control to Friction Stir Extrusion
A. Jarrell, A. Strauss and G. Cook, Vanderbilt University

8:40 AM
Effects of Ultrasonic Vibrations on Microstructure and Mechanical Properties in Dissimilar Friction Stir Welding of Al/Mg Alloys
C. Wu, Institute of Materials Joining, Shandong University

9:00 AM
Enhance Heat Generation and Joint Strength in Dissimilar Metal Ultrasonic Welds by Surface Engineering
H. Huang, J. Chen, Y.C. Lim, Z. Feng, and X. Sun, Oak Ridge National Laboratory

9:20 AM
Improving the Strength of Refill Friction Stir Spot Welding of 6061-T6 Aluminum Alloy with a New Method
T. Yuan, S. Chen and J. Shi, Beijing University of Technology

9:40 AM
Irradiated Stainless-Steel Friction Stir Weld Microstructure Characterization
W. Tang, Z. Feng, M. Gussev, R. Miller, J. Che, and S. Clark, Oak Ridge National Laboratory; J. Tatman, G. Frederick and B. Sutton, Electric Power Research Institute

10:00 AM
Analysis of Friction Stir Welding Behavior of Aluminum Cerium Alloy and Viability for Industrial Application
D. Sweitzer, Vanderbilt University

10:20 AM
Modelling the Thread Effect in Friction Stir Welding of AZ31B Magnesium Alloy
R. Giorjão and A. Ramirez, The Ohio State University; E. Monlevade and A. Tschiptschin, University of São Paulo; J. Avila, São Paulo State University

10:40 AM
Ultrasonic Welding of AZ31B Magnesium and DP590 Steel
J. Chen, Y. Lim, H. Huang, and Z. Feng, Oak Ridge National Laboratory

11:00 AM
3D Finite Element Modeling and Simulations of Ultrasonic Metal Welding
N. Shen, Tesla; H. Ding, University of Iowa; and W. Cai, General Motors Global R&D Center

11:20 AM
Mechanical and Solid-State Hybrid Joining of High Strength Aluminum Alloy AA7075-T6 by Friction Self-Piercing Riveting (F-SPR) Process
Y. Ma and Y. Li, School of Mechanical Engineering, Shanghai Jiao Tong University

SESSION 5: SURFACING AND DISSIMILAR JOINING
Session Chairs: G. Wood, Apollo-Clad Laser Cladding; Y. Li, School of Mechanical Engineering, Shanghai Jiao Tong University

8:00 AM
Abnormal Crystal Growth and Cracking During Glass-Ceramic-to-Metal Joining:

8:20 AM
Calculation of Catchment Efficiency in Laser Cladding Processes
Y. Lu and P.F. Mendez, Canadian Centre for Welding and Joining, University of Alberta

8:40 AM
Bypass-Current Plasma MIG Welding of Ti-6Al-4V Titanium Alloy to Q235 Galvanized Steel with Copper Alloy
Z. Lin, Y. Miao, J. Zou, C. Li, and J. Guo, Harbin Engineering University

9:00 AM
ICE Process Development for Cladding of Continuous Caster Rolls
F. LeClaire, G. Chouinard and R. Menon, Stoody, an ESAB Brand

9:20 AM
Influence of Cu-Coated Layer on Interfacial Intermetallics of Laser-MIG Hybrid Welded-Brazed Al/Steel Joint
T. Yang and W. Dai, Southwest Jiaotong University

9:40 AM
Analysis of Thermal Efficiency in Coaxial Laser Cladding Using a Fiber Laser
G. Wood, D. Jones and D. Hamre, Apollo-Clad Laser Cladding
## PROFESSIONAL PROGRAMS

### 10:00 AM
**Criterion for Steady-State in Laser Cladding and Heat Treating**
Y. Wang and P.F. Mendez, University of Alberta

### 10:20 AM
**Influence of Duty Cycle on the Hot Cracking in K447A Laser Cladding Layer Obtained with Quasi-Continuous Laser**
Z. Zhang, Y. Zhao, A. Wu, and J. Shan, Tonghua University

### 10:40 AM
**The Research on Forming Mechanism of Diode Laser Cladding**
M. Zhu, B. Yan, Y. Shi, and G. Zhang, Lan Zhou University of Technology

### 11:00 AM
**Thermal Spray Cladding Optimization for Steel Drill Pipe**
W. Ott, S. Liu and Z. Yu, Colorado School of Mines; J. Scott, Devasco, Inc.; H. Nguyen, ResOps Laboratory Services LLC

### 11:20 AM
**Ultrasonic-Assisted Transient Liquid Phase Bonding of Mg/Al Dissimilar Alloy Using Ni Multi-interlayers**
Y. Li, Qingdao University of Technology; A.J. Ramirez, The Ohio State University

### 11:40 AM
**Atomic Scale Characterization of Al-steel Welds Fabricated in the Solid State**
N. Sridharan and J. Poplowsky, Oak Ridge National Laboratory; H. Meyer, A. Vivek, and G. Daehn, The Ohio State University

### SESSION 6: WELDING METALLURGY I
- **Session Chairs:** B. Alexandrov, The Ohio State University and Richard Baumer, LeTourneau University

#### 8:00 AM
**Austenite Formation Kinetics During Continuous Heating in Microalloyed Steels**
A.H. Cesaro and P.F. Mendez, University of Alberta — CCWJ

#### 8:20 AM
**Carbide Precipitation During Multi-Pass Welding of Grade 22 Steel**
J. Stewart, The Ohio State University

#### 8:40 AM
**Characterization of Texture Evolution During HF-ERW of API X70 Pipeline Steel**
L. Guo, R. Kannan, N. Sharma, and L. Li, University of Alberta; N. Anderson, M. Rashid and Laurie Collins, EVRAZ Inc. NA

#### 9:00 AM
**Dissimilar Girth Weld of Internally Cladded API X65 Steel Pipe with Overmatching Requirements**
E. Miná, R. Silva, M. Motta, H. de Miranda, and C. Silva, Universidade Federal do Ceará; M.P. Paes, R. Marinho and G. Dalpiaz, Petroleo Brasliero S/A

### 9:20 AM
**Welding Investigation of a Wrought FeMnAl Steel for Armor Application**
T. Dai, D. Kyle and Z. Feng, Oak Ridge National Laboratory

### 9:40 AM
**Investigation of Heat Affected Zone Mechanical Property Variations Due to Welding Thermal Cycles in Low Density Fe-Mn-Al-C Steels**
R. Kant and J. DuPont, Lehigh University

### 10:00 AM
**Microstructural Features of Mn35Fe5Co20Ni20Cu20 Filler Material in Brazing of Nickel-Base Superalloy**
B. Schneiderman, M. Gao and Z. Yu, Colorado School of Mines; A. Chuang, Argonne National Laboratories; J. Morris, Oak Ridge National Laboratory

### 10:20 AM
**Phase Transformations and Mechanical Properties of a 10 wt% Ni Steel Welding Consumable**
E. Barrick and J. DuPont, Lehigh University; M. Sinfield, D. Bechetti and J. Farren, Naval Surface Warfare Center, Carderock Division

### 10:40 AM
**Thermal Processing Effects on Heat Affected Zone Liquation Cracking Susceptibility of Boron Micro-Alloyed 304L Stainless Steel**
J. Rodelas, D. Susan, M. Maguire, P. Duran, M. Vieira, and A. Barr, Sandia National Laboratories

### 11:00 AM
**Influence of Composition on the Solidification of HP-Modified Heat-Resistant Austenitic Stainless Steels**
S. Orzolek and J. DuPont, Lehigh University

### 11:20 AM
**Investigation of the Fracture Toughness of Hybrid Laser Arc Welds**
D. Bechetti, M. Sinfield, M. Kinsey, and N. Korinchak, Naval Surface Warfare Center

### 11:40 AM
**Nitrogen Evolution Kinetics in Arc Welding Duplex Stainless Steels**
B. Varbai, Budapest University of Technology and Economics, Department of Materials Science; J. Andersson, University West; Y. Adonyi, LeTourneau University

### SESSION 7: NEURAL NETWORKS & MACHINE LEARNING
- **Session Chairs:** W. Zhang and Y. Lu, The Ohio State University

#### 1:40 PM
**Artificial Intelligence Combined with Machine Learning System to Improve Welding Quality and Productivity for Arc, Resistance, and Friction Stir Processes**
J. Jones, V. Rhoades, M. Mann, A. Cuneo, J. Gaffney, T. Surufka, and S. Cornell, Energynitech, Inc.; T. Holverson, ITW Welding North America; J. Dydo, Gatekey Engineering
PROFESSIONAL PROGRAMS

2:00 PM Detection and Segmentation of Weld Defects with Machine Learning
X. Yu; Beijing Institute of Technology

2:20 PM Identification and Prediction of Cord Geometry in GMAW Welding with a Recurrent High Order Adaptive Neural Network and Feed Back by Infrared Images and Sound
J.J. Muñoz, S.A. Alfaro and J.R. Vargas, UnB

2:40 PM Intelligent Penetration Control Based on CNNs
W. Jiao, University of Kentucky

SESSION 8: ADDITIVE MANUFACTURING II
Session Chairs: A. Black, Los Alamos National Laboratory and G. Wood, Apollo-Clad Laser Cladding

1:40 PM Effect of Composition on Aging Response and Mechanical Behavior of Additively Manufactured 17-4 PH Grade Steels
D. Shaffer, A. Wilson-Heid, A. Beese, and T. Palmer, Department of Material Science and Engineering, Pennsylvania State University; J. Keist, Applied Research Laboratory, Pennsylvania State University

2:00 PM Anisotropic Deformation Behavior of Additively Manufactured 304L
D. Wilson, Honeywell FM&T; M. Maguire, J. Rodelas and P. Noell, Sandia National Laboratories; S. Liu, Colorado School of Mines

2:20 PM Effects of Interpass Temperature and Shielding Gas on the Microstructure and Mechanical Performance of Duplex Stainless Steels Multi-Layer Structures
D. Aidun, F. Binesh, M. Hebel, and F. Hejripour, Clarkson University; A. Bahrami, Fulton Companies

2:40 PM Tailoring Thermal Expansion in Additively Manufactured Functionally Graded Titanium Alloys
S. Hilburn, T. Simpson, T. Palmer, Pennsylvania State University

3:00 PM Integrating Computational Thermodynamics into Additive Manufacturing Models
A. Hope and P. Mason, Thermo-Calc Software Inc.

SESSION 9: WELDING METALLURGY II
Session Chairs: M. Sinfield, NSWC-Carderock and C. Fink, The Ohio State University

1:40 PM Anisotropic Deformation Behavior of Additively Manufactured 304L
D. Wilson, Honeywell FM&T; M. Maguire, J. Rodelas and P. Noell, Sandia National Laboratories; S. Liu, Colorado School of Mines

2:00 PM Mechanism of Weld Seam Formation During High-Frequency Electric Resistance Welding (HF-ERW) of Steels
R. Kannan, L. Guo, L. Li, University of Alberta; N. Anderson, M. Rashid and L. Collins, EVRAZ Inc. North America

Visit fabtechexpo.com/edu for complete session descriptions.
WELDING

PROFESSIONAL PROGRAMS

2:00 PM
Evaluation of Alternative Ni-Based Alloy Designed for Dissimilar Welding of Cladded Steel Pipes with Overmatching Requirements
R. Silva, E. Miná, M. Motta; C. Silva, and H. de Miranda, Universidade Federal do Ceará; D. Garcia, Welding Consultant; G. Dalpiaz, M. Piza Paes and R. Marinho, Petroleo Brasiliero S/A

2:20 PM
Improved Welding Penetration of Activated Flux-Tungsten Inert Gas Arc Welding of High-Manganese Steel
A. Hu, L. Zhang and Z. Feng, University of Tennessee

2:40 PM
Kinetics of Intermetallic Compound Layers Between Stainless Steel and Molten Aluminum
H. He and P. Mendez, University of Alberta

3:00 PM
Mitigation of Liquid Metal Embrittlement in Resistance Spot Welding of Galvannealed AHSS
A. Abdelmotagaly, B. Schneiderman and Z. Yu, Colorado School of Mines; J. Hu, Honda R&D Americas Inc.

3:20 PM
Study of Transient Microstructure Growth by Friction Stir Process for Dual Phase Advanced High Strength Steel
K. Taniguchi, JFE Steel Corporation; Z. Feng and Y. C. Lim, Oak Ridge National Laboratory

3:40 PM
TiC Formation Due to Titanium Machining Chips Added with Other Compounds as Ingredient for FCAW Tubular Wires
A. Bracarense and J. Fagundes, Universidade Federal de Minas Gerais

4:00 PM
Stainless Steel Plates Repair Welding and Post-Weld Characterization
W. Tang, S. Chatzidakis, R. Miller, and J. Scaglione, Oak Ridge National Laboratory; C. Schrad, Grace College

4:20 PM
Polymer as Ingredient in Submerged Arc Welding Fluxes: Effect in Morphology, Diffusible Hydrogen and Weld Metal Microstructure
A. Bracarense and P. Menezes, Universidade Federal de Minas Gerais

4:40 PM
Development of Innovative Powder Cored Tubular Wires for Additive Manufacturing and Welding
E. Sullivan and S. Liu, Colorado School of Mines & Technology

WEDNESDAY, NOVEMBER 13

SESSION 10: PLENARY SESSION
Session Chairs: YM. Zhang, University of Kentucky and J. Ramirez, Air Products

8:00 AM
Plenary — Metallurgical and Mechanical Characterization of Welded Structures Based on CFD Process Simulations
S. Na, School of MSE, XJTU

8:45 AM
Plenary — Wave Phenomena Concepts to Advance Welding Processes, Weld Metallography, and Non-Destructive Evaluation
D. Olson, Z. Yu, S. Liu, A. Lasseigne, J. Jackson, J. Poncelow, P. Kjattisaksri, Colorado School of Mines

SESSION 11: IN-SITU MEASUREMENT TECHNIQUES
Session Chairs: A. Ramirez, The Ohio State University and J. Farren, NSWC — Carderock

9:40 AM
Evaluation and Understanding of Localized Deformation in Grade 91 Steel Welds During Creep Testing
Y. Wang, Y. Wang, W. Zhang, and Z. Feng, Oak Ridge National Laboratory

10:00 AM
In Situ Measurement of Phase Transformations During Heat Treatment of Precipitation Strengthened Additive Manufacturing Materials
G. Faria and A. Ramirez, The Ohio State University

10:20 AM
In Situ Studies of Full-Field Strain/Residual Stress Evolution in Heat Affected Zone Using Digital Image Correlation
H. Chen and S. Chen, Shanghai Jiao Tong University

10:40 AM
In-Situ Observation and Numerical Simulation of Creep-Fatigue Behavior for Grade 91 Weldments
K. Zhang, W. Zhang, C. Whitt, and M. Mills, The Ohio State University

11:00 AM
Neutron Residual Stress Mapping of Repaired Spent Nuclear Fuel Welded Stainless-Steel Canisters
S. Chatzidakis, W. Tang, J. Chen, R. Miller, A. Payzant, J. Bunn, and J. Wang, Oak Ridge National Laboratory

11:20 AM
In-Situ Measurement and Numerical Simulation of Linear Friction Welding of Ti-6Al-4V
K. Zhang, W. Zhang, H. Fraser, S. Kuhr, The Ohio State University; M. Eff, EWI; A. Mann, Boeing Research and Technology

11:40 AM
Mechanical Behavior and Damage Zone Analysis of Ni-Base Superalloy Brazed Joints
J. Wildofsky, The Ohio State University

SESSION 12: HONORARY SYMPOSIUM FOR PROF. D. OLSON
Session Chairs: Z. Yu, Colorado School of Mines and S. Tate, EPRI
PROFESSIONAL PROGRAMS

9:40 AM
Invited — Welding Consumables Research Under the Leadership of Prof. David L. Olson
S. Liu and Z. Yu, Colorado School of Mines

10:20 AM
Portable and Mobile Robot Hybrid Induction Arc Welding for Large Steel Structures, Such as Wind Towers and Ships, to Improve Welding Quality and Productivity
J. Jones, V. Rhoades, M. Mann, A. Cuneo, J. Gaffney, T. Surufka, S. Cornell, Energetyntech, Inc; T. Holverson, P. Verhagen and B. Albrecht, ITW Welding North America; J. Dydo, Gatekey Engineering Inc.

11:00 AM
Invited — Diffusible Hydrogen Control Through the Management of Martensite Start Temperature Difference (·Ms) Between High Strength-Grade Pipe Steel and SS-FCAW Welds
W. Wang, Collins Aerospace and S. Liu, Colorado School of Mines

11:40 AM
FN Prediction and the WRC Diagram
T. Siewert, Siewert Solutions

SESSION 13: INDUSTRIAL TECHNOLOGY I
Session Chairs: C. Fink, The Ohio State University and C.C. Silva, Universidade Federal Ceará, Brazil

9:40 AM
Effect of Gravity on Characteristics and Formation of Porosity During VPPA Welding of Aluminum Alloys
Z. Yan, Beijing University of Technology

10:00 AM
Evaluating the Low-Cycle Fatigue Behavior of External Weld Repair for Coke Drums
S. Romo, S. Zhang and A.J. Ramirez, The Ohio State University; J. Penso, Shell Projects and Technology; D. Barborak, AZZ; H. Guo and S. Yuen, Suncor Energy Inc.

10:20 AM
Exploratory Investigation on Post Underwater Welding Heat Treatment by Underwater Induction Heating
E. Pessoa, LeTourneau University; H. Assuncão and A. Bracarense, UFMG; V. dos Santos, PUC-Rio; R. Marinho, Petrobras

10:40 AM
Fundamental Relationship Between Indentation Techniques and Toughness Applied to Temper Bead Qualification
B. Smith and A. Ramirez, Ohio State Welding Engineering; S. McCracken and S. Tate, EPRI

11:00 AM
Simple — Single Manufacturing Platform Environment: Recent Advances in Real-Time Pulsed TIG Welding-Process Monitoring and the Classification of Process Variations
R. French, H. Marin-Reyes and B. Kitchener, University of Sheffield

11:20 AM
Study on Bypass-Current Wire-Heating Plasma Arc Welding of Titanium Alloy
J. Guo, Y. Miao, Z. Lin, J. Zou, and C. Li, Harbin Engineering University

SESSION 14: PROCESS SENSING AND CONTROL
Session Chairs: D. Bechetti, NSWC-Carderock and S. Chen, Beijing University of Technology

1:40 PM
A New Method for Welding T-Joint in High-Strength Steel Sandwich Panels: Flux Bands Constricting Arc Welding Key Technology Process and Mechanism of Weld Forming
L. Wang, J. Qiao and J. Chen, Lanzhou University of Technology

2:00 PM
Applying Adaptive Controls in the Quest Towards Zero-Defect Resistance Welding
R. Cohen, Canadian Centre for Welding and Joining

2:20 PM
Research on the Characteristics of Arc Acoustic Sensing in Rotating Arc Narrow Gap MAG Welding
W. Li, J. Wang and J. Wang, Jiangsu University of Science and Technology

2:40 PM
Sensor Fusion and Automatic Control on the Arc Welding Processes (Some Applications and Results)
G. Bestard and S. Alfaro, Universidade de Brasilia

3:00 PM
Study on the Mechanism and Inhibition of the Unfusion Defect in Ultra-Narrow Gap Laser Wire Filler Welding
L. Junfeng, Southwest Jiaotong University

4:00 PM
Virtual Reality Human-Robot Collaborative Welding
Q. Wang and Y. Zhang, University of Kentucky

4:20 PM
A Simple Way to Recognize the Welding Penetration in K-TIG Welding
Y. Cui and Y. Shi, South China University of Technology

Visit fabtechexpo.com/edu for complete session descriptions.
## SESSION 15: HONORARY SYMPOSIUM FOR PROF. D. OLSON II
Session Chairs: Z. Yu, Colorado School of Mines and U. Duman, LAM Research

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<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speakers</th>
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<tbody>
<tr>
<td>1:40 PM</td>
<td>Invited — A Joint Effort to Tame Marine Corrosion</td>
<td>G. Wang, gMarine</td>
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<tr>
<td>2:20 PM</td>
<td>Joining of Aluminum Sheets by Combined Solid State and TLP Bonding Processes</td>
<td>J.E. Indacochea, University of Illinois</td>
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<tr>
<td>2:40 PM</td>
<td>In-Situ Radiography of Hydrogen Porosity Growth and Development in Aluminum Welds</td>
<td>A. Barraza, C. Cross, C. Stull, and J. Martinez, Los Alamos National Laboratory; C. Fink, The Ohio State University</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>Prediction of Stress Corrosion Cracking in Type 304 Stainless Steel Spent Nuclear Fuel Dry Storage Canisters by Method of the Controlled Environment Modified Implant Test</td>
<td>S. Gordon, X. Wu, Z. Yu, and S. Liu, Colorado School of Mines</td>
</tr>
<tr>
<td>3:20 PM</td>
<td>Effects of Microstructure and Residual Stress on Pitting Initiation and Growth in 304 Stainless Steel</td>
<td>Z. Yu, X. Wu, S. Gordon, S. Liu, D. Olson, and Z. Shayer, Colorado School of Mines; C. Alexander, University of South Florida; E. Schindelholz and C. Bryan, Sandia National Laboratories</td>
</tr>
<tr>
<td>3:40 PM</td>
<td>Update on the Use of Wave Phenomena Concepts for Non-Destructive Evaluation of In-Service Welded and Clad Components</td>
<td>A. Lasseigne, R. Schaffler, W. Cochran, and J. Jackson, G2MT, LLC; D. Olson, Colorado School of Mines</td>
</tr>
<tr>
<td>4:00 PM</td>
<td>Solidification Characterizations in Dissimilar Metal Welds</td>
<td>F. Hejripour, D. Aidun, B. Helenbrook, and D. Valentine, Clarkson University</td>
</tr>
<tr>
<td>4:20 PM</td>
<td>Recent Investigation on the LME Cracking in Perspective of Resistance Spot Welding for Zn-Coated AHSSs</td>
<td>Y. Park, Dong-Eui University</td>
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## SESSION 16: WELDABILITY II
Session Chairs: M. Tumuluru, US Steel and W. Tang, Oak Ridge National Laboratory

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<tr>
<td>2:00 PM</td>
<td>Characterization of Weld Hydrogen Cracking Susceptibility</td>
<td>J. Moulton and A. Dinovitzer, BMT Canada; M. Quintana, Independent Consultant</td>
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<tr>
<td>2:20 PM</td>
<td>Effect of Strain on Stress Relief and Service Age Cracking in Austenitic Stainless Steels and Nickel Base Superalloys</td>
<td>J. Duch and J. DuPont, Lehigh University</td>
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<tr>
<td>2:40 PM</td>
<td>High-Throughput Weldability Screening and Evaluation of High Entropy Alloys for Structural High Temperature Applications</td>
<td>A. Martin; T. Estep and C. Fink, The Ohio State University</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>Physical Simulations and Weldability Predictions</td>
<td>Y. Adonyi, Letourneau University and J. Andersson, University West</td>
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<tr>
<td>3:20 PM</td>
<td>Seamless Flux Cored Wire Designed for High Strength Pipeline Applications</td>
<td>R. Fuchs, voestalpine Bohler Welding USA</td>
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<td>3:40 PM</td>
<td>The Transverse Motion Weldability Test for Solidification Cracking</td>
<td>C. Xia, Jiangsu University of Science and Technology; K. Liu, Shandong University; T. Soysal and S. Kou, University of Wisconsin</td>
</tr>
<tr>
<td>4:00 PM</td>
<td>Mitigation of Stress Relaxation Cracking (SRC) in Thick Stainless-Steel Weldments for High Temperature Applications</td>
<td>T. Pickle, X. Wu and Z. Yu, Colorado School of Mines; J. Vidal, National Renewable Energy Laboratory</td>
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<td>4:20 PM</td>
<td>Gas Tungsten Arc Weldability of L-PBF Fabricated 304L Stainless Steel</td>
<td>D. Gonzales, Blue Origin; S. Liu, Colorado School of Mines; D. Javernick and M. Johnson, Los Alamos National Laboratory</td>
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<tr>
<td>4:40 PM</td>
<td>Using Fixed-Displacement Thermal Cycling to Simulate Welding Thermo-Mechanical Histories Leading to Ductility-Dip Cracking</td>
<td>S. Luther and B. Alexandrov, The Ohio State University</td>
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## THURSDAY, NOVEMBER 14

## SESSION 17: HIGH-ENERGY DENSITY PROCESSES
Session Chairs: S. Tate, EPRI and A. Black, Los Alamos National Laboratory

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<th>Time</th>
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<tr>
<td>8:00 AM</td>
<td>Benefits of Deep Penetration Keyhole Mode Weldments Under Reduced Ambient Pressures — Experiments and Modeling</td>
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8:00 AM  
Design & Manufacturing Industrial Scale Aluminum Parts by Vacuum Diffusion Bonding  
U. Duman, LAM Research; J. Pfeiffer, C. Eckardt and P. Müller, PVA TePla

8:20 AM  
Seamless Cored Wires — The Next Step of Evolution in Cored Wire Consumables  
J. Stoll, voestalpine-Bohler Welding

8:40 AM  
16-8-2 History, Production and Use  
C. Patrick, ALS Maverick Testing Laboratories Inc.

9:00 AM  
Deoxidation & Welding Implications in Super-Austenitic Grades  
D. O’Donnell, Rath Gibson

9:20 AM  
Improper Weld Field Fabrication Leading to Plant Shutdown  
A. AlShawaf, SABIC

9:40 AM  
HF Weld Process Optimization  
O. Tupalo, Thermatool Corp.

10:00 AM  
How Clean is Clean?  
F. Cea, RoboVent

10:20 AM  
Resistance Weld Monitoring for Improved Product Quality  
M. Boyle, Amada Miyachi America Inc.

10:40 AM  
Framework for CAD to Part of Large-Scale Additive Metals Manufacturing in Arbitrary Directions  
J. McNeil and W. Hamel, University of Tennessee-Knoxville

11:00 AM  
Assessment of Electrical Power Quality for Both AC and MFDC Resistance Spot Welding Processes  
O. Rosa and L. Vilarinho, Federal University of Uberlandia

11:20 AM  
Weld Fume Safety Practices for Working in Enclosed Spaces  
D. Beaumont, Translas Canada Industries Ltd.

AWS POSTER SESSION

The AWS Poster Session is an integral part of the AWS Professional Program. Graphic displays of technical achievements are presented for close, first-hand examination in the Poster Session. Posters present welding results and related material, which are best communicated visually, as well as research results that call for close study of photomicrographs, tables, systems architecture, or other illustrative materials.
EDUCATION SESSIONS

TUESDAY, NOVEMBER 12

9:00 AM – 4:30 PM
AWS/WELD-ED EDUCATORS CONFERENCE — USING ADVANCED WAVEFORMS IN WELDING EDUCATION

8:30 AM – 8:45 AM
Welcome / Introductions
Monica Pfarr, Executive Director, AWS Foundation

8:45 AM – 9:15 AM
Waveform Technology in Welding Education
Rick Polanin, AWS Vice President, Chair Education and Training Committee

9:15 AM – 10:15 AM
Advanced GMAW Waveforms

10:15 AM – 10:30 AM — BREAK

10:30 AM – 11:30 AM
Plummer Lecture
Innovative Approaches to Welding Education
Daniel Turner, Yuba College

11:30 AM – 12:15 PM
Advanced GTAW Waveforms
Nick Peterson, Miller Electric

12:15 PM – 1:00 PM
Lunch - Plasma Systems
Jim Colt, Hypertherm

1:00 PM – 2:00 PM
Advanced SAW Waveforms

2:00 PM – 3:00 PM
Applications of Advanced Waveforms

3:00 PM – 3:45 PM
Career Information Resources for Educators
Fabricators and Manufacturers Association
Boy Scout Merit Badge
Summer Workshop Resources

3:45 PM – 4:00 PM
Best Practice Discussion
Weld-Ed Partners

4:00 PM – 4:15 PM
Wrap-Up & Evaluations
Rick Polanin and Monica Pfarr

AWS SOCIETY EVENTS

MONDAY, NOVEMBER 11

7:00 AM – 8:30 AM
W30: AWS PRAYER BREAKFAST
This year’s speaker at the AWS Prayer Breakfast will be Mr. Rob Purvis. Currently, he is the AWS Director, for District 22, in Northern California, and is extremely proud of his almost 34 years of membership.

9:00 AM – 10:00 AM
AWS OPENING SESSION / ANNUAL BUSINESS MEETING
During the AWS Opening Session and the 100th Annual Business Meeting, 2019 AWS President Dr. Thomas J. Lienert, will give the Presidential Report and Robert W. Roth, will be inducted as the AWS President for 2020. Following the induction, the 2019 Class of AWS Counselors and Fellows will be introduced. This meeting is open to all AWS members and show registrants.

10:30 AM – 11:30 AM
COMFORT A. ADAMS LECTURE
The Comfort A. Adams lecture this year is titled “The Emergence of Quantitative Defect Acceptance Criteria as the Enabler from Dissimilar Materials Joining to Additive Manufacturing” by Dr. Pingsha Dong. Dr. Pingsha Dong is a professor of naval architecture, marine engineering, and mechanical engineering at the University of Michigan. His research and teaching interests include advanced fatigue and fracture assessment methodologies and computational methods for integrated manufacturing process simulation ranging from manufacturability to structural performance evaluations.

6:30 PM – 8:30 PM
AWS OPENING RECEPTION
On behalf of the AWS president and first lady, we invite you to attend the AWS Opening Reception. This reception is the official kick off to FABTECH 2019 for AWS members. Attendees will have the opportunity to shake hands with our AWS officers and CEO, as well as network with AWS members from across the globe.

TUESDAY, NOVEMBER 12

12:00 PM – 2:00 PM
AWS AWARDS/AWS FOUNDATION LUNCHEON
As the Society and the Industry it serves have grown, so has the need to recognize outstanding scientists, engineers, educators, and researchers. Join us as we celebrate their incredible accomplishments. The AWS Foundation will also recognize recent scholarship, grant, and fellowship recipients, along with major donors who support the AWS Foundation’s mission to advance the welding industry through education and research. The cost for attending the ceremony is $30 and is open to all registrants. Tickets will also be available at the door.

2:00 PM – 3:00 PM
AWS NATIONAL NOMINATING COMMITTEE — OPEN MEETING
AWS members are requested to submit their recommendations for national officers to serve during 2021. Nominations must be accompanied by 20 copies of biographical material on each candidate, including a written statement by the candidate as to his/her willingness and ability to serve if nominated and elected.
WEDNESDAY, NOVEMBER 13

10:00 AM
THOMAS MEDAL LECTURE
This year’s lecture will be given by Doug Kautz on “Developing Standards for New Technologies.” Kautz is a graduate of Colorado School of Mines. He has worked for Rockwell International, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, and now, Leidos Inc.

10:30 AM (Immediately following the Thomas Medal Lecture)
AMERICAN COUNCIL OF IIW
American Council of the IIW is the meeting of the U.S. member body of the International Institute of Welding.

12:00 PM – 2:00 PM
AWS EXCELLENCE IN WELDING AWARDS CEREMONY AND LUNCHEON
By invitation only.
Get the Best Hotel Selection and Savings

Book your stay through onPeak, FABTECH’s Official Hotel Provider, for guaranteed lowest rates and big benefits — including complimentary shuttle service and no booking or service fees! Reserve your rooms early for the best selection and price — hotels sell out quickly. Visit fabtechexpo.com/accommodations.

Start Planning Now!

Download the FABTECH app to access show info on the go — exhibits, a floor plan, sessions, an agenda planner, and more — at fabtechexpo.com/mobile-app.

DESTINATION CHICAGO

Chicago has something for everyone. From world-class museums, parks, and amazing architecture to shopping on the Magnificent Mile, a wide range of dining options, and much more!
AMADA’s ENSIS fiber laser technology utilizes a proprietary and highly-innovative resonator to automatically change the beam mode to accommodate whatever material and thickness being processed. Now, the latest evolution adds another dimension with an innovative collimation system to automatically control beam diameter and beam configuration for unprecedented productivity.

To keep pace with the unmatched power and productivity of the ENSIS Series, it’s essential to pair it with automated material handling such as the AMS 3015 CL (Cycle Loader). Designed and built in Brea, California, the AMS CL’s modular design allows fabricators to easily expand their automation capabilities as future needs evolve.

**Key Evolution Factors:**
- Now available in 6kW and 9kW
- Addition of collimation system expands ENSIS cut quality and capabilities
- Collimation mechanism does not limit access to cutting lens or head maintenance
- Infinite mode and diameter control combination is an industry first
- 1-second clean pierce in 1" plate
- Up to a 66% reduction in process time when compared to conventional fiber lasers at the same wattage

**Unmatched Cutting Versatility**
Efficient Processing of Thin Materials and Thick Plate

AMADA’s new Collimation System provides infinite mode and diameter control combinations — AN INDUSTRY FIRST.

To learn more about how you can leverage ENSIS technology to achieve unprecedented productivity, contact AMADA today.

To learn more about how you can leverage ENSIS technology to achieve unprecedented productivity, contact AMADA today.

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FABTECH
NORTH AMERICA'S LARGEST METAL FORMING, FABRICATING, WELDING AND FINISHING EVENT

NOVEMBER 11-14
McCORMICK PLACE
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