



AFS METALCASTING CONGRESS

April 25-27, 2023
Cleveland, OH

Spark Success.

Metalcasting Congress 2023 Show Guide

April 25-27, 2023
Cleveland, Ohio

Produced by the American Foundry Society | AFSinc.org

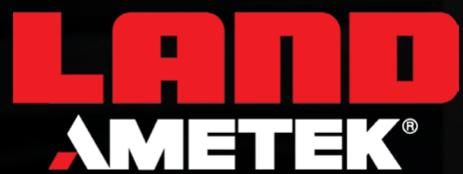


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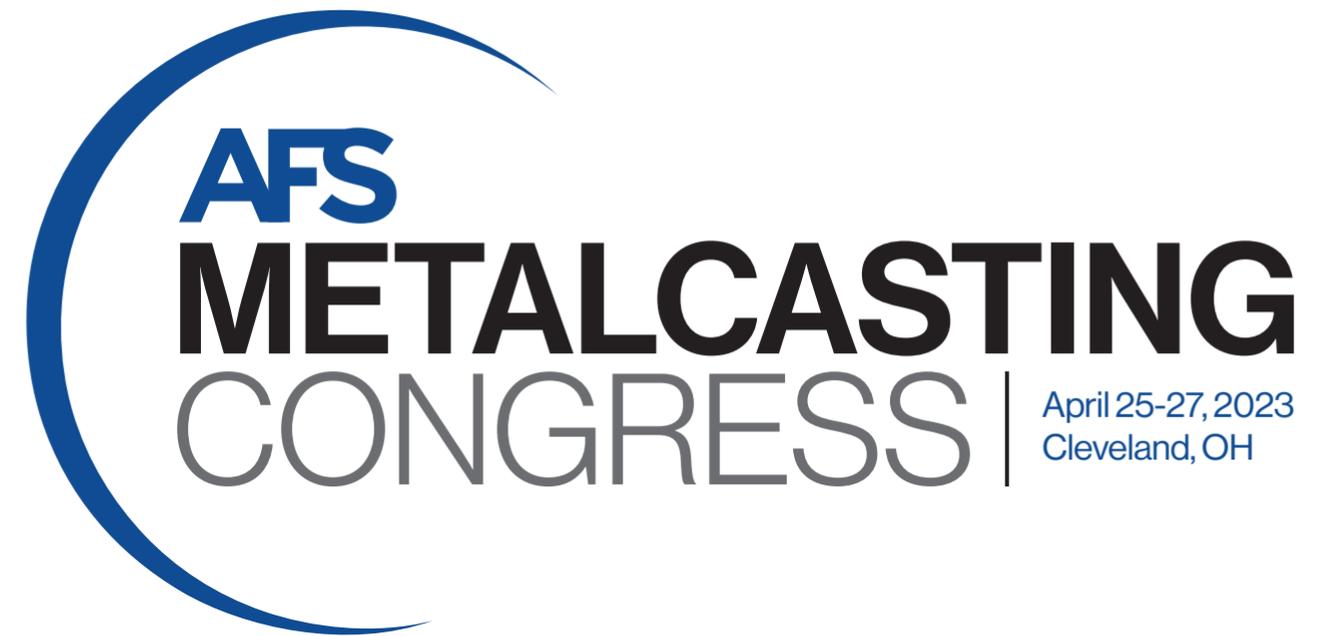
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April 25-27, 2023
Cleveland, OH

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AFS METALCASTING CONGRESS

April 25-27, 2023
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Dear Members and Friends of AFS,

Welcome to North America's premier annual metalcasting industry convention and showcase!

Together, the metalcasting supply chain generates \$110.5 billion in annual economic activity and supports 490,000 jobs. Our modern economy depends upon the highly engineered castings that are possible only through the fine work of our industry's employees, many of whom are attending Metalcasting Congress 2023 here in Cleveland, as well as the technologies and products offered by our industry's world-class suppliers.

We trust you will take full advantage of the show's informational, educational and business-networking opportunities. The contacts you make this week will support your technical and business success for years to come. Stop by The AFS HUB on the show floor, or approach any AFS employee (in blue shirts) for answers to any questions you may have during the show.

Thank you again and enjoy Metalcasting Congress 2023!

Warm regards,



Doug Kurkul
Chief Executive Officer
American Foundry Society

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General Information

Locations & Hours

Registration

Exhibit Hall Level – Adjacent to Room 13

Tuesday, April 25	7 a.m. – 5 p.m.
Wednesday, April 26	7 a.m. – 5 p.m.
Thursday, April 27	7:30 a.m. – Noon

Exhibit Hall

Exhibit Hall Level – Exhibit Hall C

Wednesday, April 26	9 a.m. – 6 p.m.
Thursday, April 27	9 a.m. – Noon

Exhibit Service Center & Other Service Desks

Exhibit Hall Level – Exhibit Hall C

Wednesday, April 26	9 a.m. – 6 p.m.
Thursday, April 27	9 a.m. – Noon

Keynote Presentations

Ballroom Level – Room 26ABC

Tuesday, April 25	10:30 – 11:30 a.m.
Wednesday, April 26	10:30 – 11:30 a.m.
Thursday, April 27	10:30 – Noon

Technical & Management Sessions

Exhibit Hall Level – Rooms 20, 21, 22, 23, 24

Tuesday, April 25	8 a.m. – 4:45 p.m.
Wednesday, April 26	8 a.m. – 4:45 p.m.
Thursday, April 27	8 – 10:15 a.m.

Casting Designers & Buyers Sessions

Exhibit Hall Level – Exhibit Hall C – The HUB – 423

Wednesday, April 26	9:15 a.m. – 2:15 p.m.
Thursday, April 27	9:15 – 9:45 a.m.

AFS Institute Courses

Exhibit Hall Level – Room 19

Tuesday, April 25	8 – 10:15 a.m. 1:30 – 4:45 p.m.
Wednesday, April 26	8 – 10:15 a.m. 3:15 – 4:45 p.m.
Thursday, April 27	8 – 10:15 a.m.

AFS Show Office, Technical Office, & Speaker Ready Room

Exhibit Hall Level – Room 13

Monday, April 24	7 a.m. – 4:45 p.m.
Tuesday, April 25	7 a.m. – 4:45 p.m.
Wednesday, April 26	7 a.m. – 4:45 p.m.
Thursday, April 27	7 a.m. – Noon

Excellence in Service Registration

The traditional book for registering your years of volunteer service in the metalcasting industry is located in The HUB - Booth 423. AFS Members who have served the industry for five or more years are invited to register and receive their Volunteer Milestone Pins.

Policy on Audio and Video Recording

AFS reserves the right to any audio and video reproduction of any part of Metalcasting Congress 2023. Recordings (audio, video, still photography, etc.) intended for personal use, distribution, publication or copyright without the express written consent of the association and the individual authors or exhibitors are strictly prohibited.

Minimum Age Restriction

No one under the age of 16 is permitted on the exhibit floor at any time.

Antitrust Policy

The Antitrust Policy Statement of the American Foundry Society is available to anyone attending Metalcasting Congress 2023. Copies are available in the AFS Show Office.

American Foundry Society Code of Conduct

The American Foundry Society invites attendees to participate in AFS conferences, courses, committees and other events in a spirit of collegiality, collaboration, professionalism, and respect as we endeavor to advance AFS's mission—to provide members of the metalcasting supply chain with advocacy support, technical and management education, and access to innovative shared research and technology.

When you attend an AFS event, you agree to the following:

Treat all attendees—including registrants, guests, speakers, volunteers, exhibitors, staff, service providers, and others in attendance—with respect and consideration.

- Respect the boundaries of others.
- Give permission that AFS can use pictures, videos and audio recordings taken during AFS-related events for AFS promotional purposes. AFS can use your likeness without remuneration.
- Be collegial and collaborative in your discussions, communicating openly and with civil attitudes.
- Respect confidentiality requests from speakers and other attendees. AFS Committee meetings allow for the open exchange of information and are confidential to those in attendance.
- Obey all applicable laws, rules and policies. These include rules and policies of the meeting venue, hotels, or any other site where your AFS affiliation is likely to be displayed.
- Look out for one another. Immediately alert emergency services, meeting or property security personnel, AFS staff, or AFS leadership if you notice someone in distress or see a dangerous or potentially dangerous situation.

Unacceptable behavior at an AFS event includes:

- Physical or verbal abuse of any attendee.
- Being disruptive, stalking, following, threatening, or intimidating anyone.
- Drinking excessively or becoming intoxicated.
- Harassment of any kind, including unwelcome sexual attention and inappropriate physical conduct.
- Making comments or engaging in conduct that is racist, sexist, ageist, or otherwise discriminates against or is offensive to a group or class of people.
- Audio or video recording or taking images of another's presentation, posters, or materials without permission.
- Meetings may be recorded by AFS staff for business purposes. Any recordings or transcription by the participants or through artificial intelligence, present or not, is prohibited.

Contact us to report an incident

If, while at an AFS event, you are personally involved in an incident, or you witness an incident involving others that violates this Code of Conduct, please let AFS staff know about it immediately. You can speak directly with a member of the AFS staff leadership concerning an incident, or you can use a name-optional reporting form that will soon be a part of the AFS website.

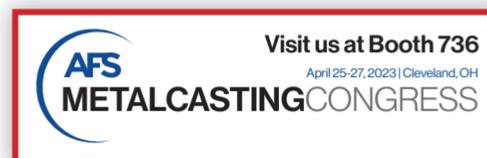
If you experience or witness behavior that is an imminent or serious threat to public safety or is a criminal act, you should take action to maintain your own personal safety and contact 911 emergency services immediately.

AFS's Commitment to Quality Member/Attendee Experiences

AFS is committed to providing our members and event attendees with a quality experience. We take any violation of the above standards extremely seriously. AFS reserves the right to bar any person who violates this Code of Conduct from further participation in the event without refund. AFS may also suspend or expel any person who violates this Code of Conduct from AFS membership or from attending or participating in future AFS events.

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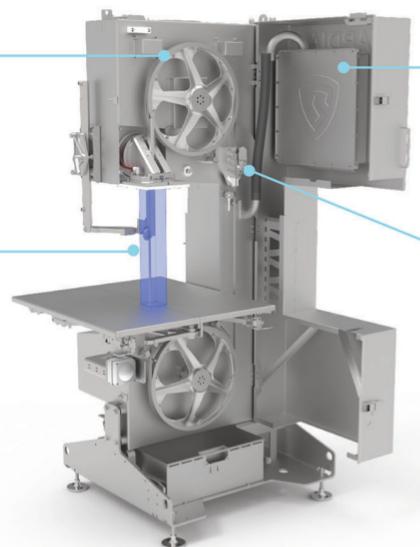


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Special Events

Volunteer Leadership Awards Luncheon

Tuesday, April 25 | 11:45 a.m. – 1:15 p.m.
Ballroom Level – Room 25BC | Ticketed Event - \$70

Join us for a fun, fast-paced awards luncheon, which combines the former Division Recognition Luncheon and President's Luncheon & Annual Business Meeting. Catch up with friends while AFS officers welcome four new board members. AFS Technical and Management Division chairs will also present key national and divisional awards including the presentation of the Scientific Merit and Service Citation awards.

Annual Reception & Banquet

Tuesday, April 25 | Cashless bar reception 6 – 7 p.m.
Hilton Hotel – Center Street Room BC

Banquet 7 – 9 p.m. | Hilton Hotel – Hope DE
Ticketed Event - \$125

Join us for business networking and the presentation of the highest AFS honors, the Gold Medals. The cashless bar opens at 6 p.m. The awards presentation and banquet start at 7 p.m. The President's After Party starts at 9 p.m. Recommended dress is business formal.

Women in Metalcasting Breakfast

Wednesday, April 26 | 7:30 – 9 a.m.
Ballroom Level – Room 25BC | RSVP required

This event is open to members of Women in Metalcasting. It includes a continental breakfast and networking with people who work in all facets of the metalcasting industry.

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Past Presidents' Luncheon

Wednesday, April 26 | 11:30 a.m. – 1 p.m. | IL Venetian - The Piccolo Room | Must be a previous AFS President to attend

The annual gathering for all past AFS Presidents.

Exhibit Floor Reception

Wednesday, April 26 | 5 – 6 p.m.
Exhibit Hall Level - Exhibit Hall C | Open to all attendees

Attendees are encouraged to mingle on the exhibit floor with exhibitors. Enjoy snacks and refreshments.

Future Leaders of Metalcasting Reception

Wednesday, April 26 | 6 – 7 p.m.
Exhibit Hall Level – Room 16 | Open to all attendees

Join Members of the AFS Future Leaders of Metalcasting and other industry professionals for a fun networking reception for rising leaders. Bring your business card to enter the prize raffle. All attendees are welcome to come on Wednesday, April 26, in Room 16. For more information, contact Future Leaders of Metalcasting's liaison Cathy Potts at cpotts@afsinc.org.

Sponsored by:



Alumni Dinner

Wednesday, April 26 | 6 – 9 p.m. | Rock & Roll Hall of Fame
Must be a member of AFS Alumni to attend
Ticketed Event - \$125

Alumni will experience the Rock & Roll Hall of Fame, touring the special exhibits and permanent installations. Buses depart the convention center at approximately 5:45 p.m. from the Lakeside Entrance. Return shuttles began at 8:15 p.m. Must be AFS Alumni to attend.

Exhibit Floor Breakfast

Thursday, April 27 | 9 – 10 a.m.
Exhibit Hall Level - Exhibit Hall C | Open to all attendees

Attendees are encouraged to visit exhibitors while grabbing a cup of coffee and breakfast.

- ▶ Furnace Charge Feeders
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- ▶ Shot Blast Feeders



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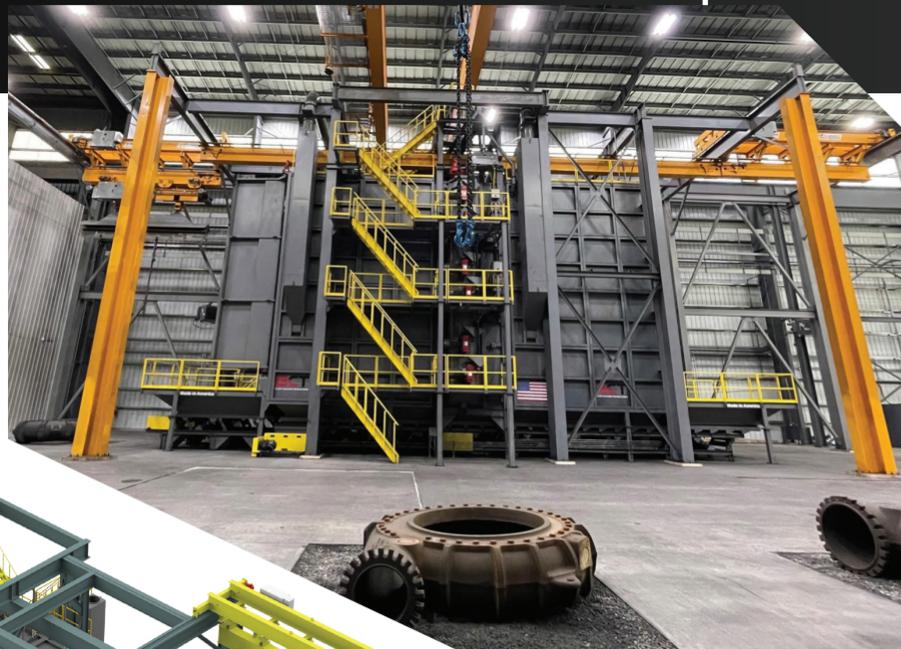
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The AFS HUB

Booth 423

The AFS HUB is a dedicated area for connecting with AFS staff and other attendees. This area features the AFS Store, AFS Products & Services, AFS Institute, Foundry-in-a-Box, and sessions for the Casting Designers & Buyers Track.

Ongoing features and activities include:

AFS Store

The premier bookseller for people in the metalcasting industry. Practical and technical publications will be on hand, along with signature clothing and gift items.

AFS Products & Services

Whether you are a member of AFS or plan to become one, stop by and learn about the competitive edge AFS membership provides. Issues of *Modern Casting*, *Casting Source*, and *Melting Point* magazine will be available. Stop by and pick up the latest issues.

Foundry-in-a-Box

Walk through and get "hands-on" by making your own casting. See how AFS conducts outreach with its customized Foundry-in-a-Box kit.

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Special thanks to:



Casting Designers & Buyers Track

Casting Designers & Buyers Track sessions run Wednesday and Thursday in the Casting Source Theater at the AFS HUB. These sessions are available to all Metalcasting Congress 2023 attendees.

The Casting Source Theater is sponsored by:



IJMC/FEF Student Research Competition

Wednesday, April 26 | 11:45 a.m. - 12:45 p.m.

The IJMC-FEF Student Research Competition empowers undergraduate college students to showcase their metalcasting research projects at the 127th Metalcasting Congress. Winners will earn scholarships and be published in the *International Journal of Metalcasting*, a valuable step in students' careers!

Thank you for coming!



Please join us for Metalcasting Congress 2024 in Milwaukee and CastExpo 2025 in Atlanta.

Learn more at AFSinc.org.

Keynote & Hoyt Lecture Speakers



Tuesday, April 25 | 10:30 – 11:30 a.m.

Fathers, Baseball and Field of Dreams

Dwier Brown

Actor, author, and inspirational speaker

Ready for some inspiration? Dwier Brown appeared in one of the most popular movies of all time, Academy Award-nominated *Field of Dreams*, as the father of Kevin Costner's character. Although he has appeared in scores of films, television shows, and stage productions, including *The Thorn Birds*, *ER*, *Ally McBeal*, and *Murder: She Wrote*, Dwier is still best known for his inspirational "Wanna Have a Catch?" scene as Ray Kinsella in that film. Poignant stories from viewers about how the movie changed their own lives, and their relationships with their own fathers, led Dwier to write the moving memoir, *Build It and They Will Come: Fathers, Fate and Field of Dreams*. He also co-owns the Baseball Hall of Dreams in Dyersville, Iowa, not far from where the film was shot. Join us for this uplifting presentation.



Wednesday, April 26 | 10:30 – 11:30 a.m.

Hoyt Memorial Lecture: "Innovate or Die"

John R. "Chip" Keough

Chairman of LightSpeed Concepts Inc., President of Keotech Inc.

When all inputs are included, energy is over half the cost of manufactured goods. All metal components start as castings. Metalcasting is the lowest energy, most direct manufacturing line from metallic ores to metal products. The metalcasting industry is the largest recycling body on the planet. However, the metalcasting industry is slow to develop and deploy new products and methods. With Industry 4.0 upon us, we must "Innovate or Die."

A pioneering metalcasting entrepreneur and dedicated mentor, Hoyt Lecturer John "Chip" Keough is chairman of LightSpeed Concepts Inc. and president of Keotech Inc. (Albion, Michigan), and former adjunct professor to University of Michigan's Materials Science and Engineering Department. He received the 2005 AFS Award of Scientific Merit and the 2014 Foundry Educational Foundation E. J. Walsh Award. In 2018, he received the AFS Pangborn Gold Medal, the society's highest honor.

The Hoyt Memorial Lecture is one of the industry's most prestigious annual addresses. It has been a highlight of Metalcasting Congress since 1938.



Thursday, April 27 | 10:30 a.m. – Noon

The Great Debate: Additive Manufacturing v. Castings v. Forgings

Moderator:

Vasko Popovski
Ransom & Randolph

Additive Manufacturing:

John Wilczynski
America Makes- National Additive
Manufacturing Innovation Institution

Richard Huff
ASTM International

Castings:

Randy Oehrlein
Carley Foundry Inc.
Charles Monroe
The University of Alabama

Forgings:

Bud Kinney
Retired from IMT Corporation
Pat Burke
Pursuit Aerospace

It's the ultimate question in manufacturing: Which process is best when it comes to making metal components? Metalcasting Congress is bringing together experts from the casting, forging, and additive realms to try to settle this argument once and for all in "The Great Debate." Part informative presentation, part debate, part lighthearted roast, each process will be represented by two experts who will speak on behalf of their respective industries, highlighting their merits (and their opponents' demerits) to determine the best of the best.



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Show Schedule

Tuesday, April 25, 2023

7 a.m.

Room: 16

Author Chair Breakfast

This breakfast is for AFS speakers, session chairs, students and staff to meet and coordinate details for the day's educational sessions.

8–9 a.m.

Aluminum & Light Metals

Room: 22
Session Chair:

Girish Ramdasi
Navistar Inc., Aurora, IL

Bond Formation Between Aluminum-based Metal Matrix Composites and Aluminum Alloys in Compound Castings (23-052)

The use of inserts allows for the selective reinforcement of castings to improve mechanical properties, including surface hardness and wear rate. Metal surfaces that undergo wear on account of friction can be strengthened using MMC inserts. An essential factor in the manufacture and application of compound casting involving MMC inserts has been the bond strength between the insert and alloy. This work studied fluxes (CsAlF₄ and LiAlF₄), pre-heating, and Ni plating to improve the bond strength between A206 and A201-Al₂SiO₅ fiber MMC. It was observed that Flux 1 (G-2004), Flux 2 (CS-2020), and Nickel plating, when used with preheating the insert up to 200°C, led to the formation of a diffusion bond. The effect of fluxes and plating has been discussed, along with the impact of the insert oxide layer on the formation of diffusion bonds. The microstructure formed at the interface between casting and insert was analyzed.

Luke Osvatic, Pablo Zertuche-Flores, Mason Porter Steffes, Kaustubh Rane, Swaroop Behera, Benjamin Church, and Pradeep Rohatgi, University of Wisconsin-Milwaukee, Milwaukee, WI; David Weiss, Vision Materials, Manitowoc, WI

Effect of Cooling Rate on Microstructure and Physical Properties of Hypereutectic Al-Ce Alloys (23-048)

The present study investigated the effect of cooling rate on the solidification of hypereutectic Al-Ce alloys, where varying cooling rates were obtained using a step casting mold. The thinner section sizes led to higher cooling rates, leading to a decrease in grain size. The microstructure, density, hardness, and phase composition of the alloy samples were observed and analyzed. The results showed that a high cooling rate led to a reduction in the size of the intermetallic particles while improving the hardness of the alloy. The phase identification showed that the phases consisted of eutectic Al, eutectic Al₁₁Ce₃, and primary Al₁₁Ce₃.

Swaroop Behera, Jenna Van Hoogstraten, Kaustubh Rane, and Pradeep Rohatgi, University of Wisconsin-Milwaukee, Milwaukee, WI; David Weiss, Vision Materials, Manitowoc, WI

Cast Iron

Room: 23
Session Chair:

David Gilson
SinterCast Inc., Naperville, IL

Honorary Lecture: Academia – The Inoculant of the Cast Iron Industry Future Structure (23-123)

Jingjing Qing and Mingzhi Xu, Georgia Southern University, Statesboro, GA

This presentation highlights the significant roles that academia plays in shaping the future of the cast iron industry. Educators are the bridges between students and industry, who not only “equip” students with the necessary knowledge and skills, but also direct them to develop a career path in the cast iron industry. Collaborations between industry and academia are the keys to maintaining a sustainable ecosystem, fostering students to become the next generation of educators or foundry engineers. In this presentation, the presenters will (1) inspire younger generations to involve themselves in cast iron research by showcasing their experiences of accomplishing award-winning cast iron research projects as previous students, (2) share insights on developing cast iron education and research programs in academia as educators, and (3) catalyze an intimate relationship between industry and academia.

Engineering & Smart Manufacturing

Room: 21
Session Chair:

Nick Fox
John Deere Foundry Waterloo, Abingdon, IL

Panel: Energy, Carbon and Technology: The Connection in Foundries (23-088)

Michael Stowe, Advanced Energy, Raleigh, NC; Bob Baird, General Motors, Carmel, IN; Jeff Krause, HA International LLC, Westmont, IL; Eric Nelson, Dotson Iron Castings, Mankato, MN; Adriano Lima, Magna, Ontario, Canada; Bryant Esch, Waupaca Foundry Inc., Waupaca, WI

Foundries have energy and carbon intense processes. The energy consumed in foundries is directly related to the carbon footprint of the foundry site. Additionally, as foundry technology develops, the proper application of this can help to reduce the energy consumed and the carbon produced in foundries. This panel will be made up of subject matter experts in energy efficiency, energy management, and carbon mapping to provide key resources and processes to help foundries meet their sustainability goals. The panel will also have key foundry operational personnel who have worked on energy related projects at their sites and will share some of their stories. Topics include energy efficiency in foundries, energy management resources, carbon mapping, and application of foundry technology.

Through presentation and discussion, the panel will show how energy, carbon, and technology are tied together and will provide practical implementation ideas, resources, and real-world foundry stories to demonstrate this connection.

Molding Methods & Materials

Room: 24
Session Chairs:

Scott Giese
University of Northern Iowa, Cedar Falls, IA
Victor Okhuysen
California Poly State University, Pomona, CA

Reducing Purging Times for a Turbo Volute Core, Optimizing Quality and Tool Life (23-008)

Mauricio Velazquez Blandino, Magma Foundry Technologies Inc., Schaumburg, IL

Often in the process of making volute cores for turbochargers, both phases of shooting and curing become challenging with the potential to create surface defects in the casting. These core cavities have limited venting points due to casting surface requirements to avoid creating deficiencies in turbo performance. This venting limitation is often solved just for the sand shooting phase, so then the purging process becomes the bottle neck and most expensive part of the process. By evaluating different venting configurations, we can quantify and qualify the optimum configuration for shooting and compare cycle time highlighting the impact to the cost of the core maintaining the desired compactability. The assessment of tool surface materials, machine blow pressure, inlet design, and grain morphology will be presented with the intention of understanding how these variables influence tool wear and life expectancy in the process of making these cores.

Molding Methods & Materials

Room: 24
Session Chairs:

Scott Giese
University of Northern Iowa,
Cedar Falls, IA

Victor Okhuysen
California Poly State
University, Pomona, CA

Permeability Pinholes and Porosity (23-099)

Charles Bates, Alchemcast, Auburn, AL

The purpose of this project is to develop a robust technique for measuring sand permeability under a variety of foundry conditions including sand density, binder concentration, type of binder, path length through the sand, and pressure effects on the ability of gas to escape the mold or core. Porosity has been identified as the largest contributor to scrapped castings. This presentation describes the equipment with photographs and shows data on an AFS 56 GFN sand. The data must be sufficiently detailed to allow determinations of Darcy coefficients that can be put into simulation codes so predictions can be made about porosity formation. Future developments will deal with gas evolution from molds and cores, both coated and uncoated.

8 – 10:15 a.m.

AFS Institute Course

Room: 19

Metalcasting Process Basics – Part One (23-115)

Patrick Kluesner, Grede Castings, Southfield, MI

This course provides participants with a basic overview of the metalcasting process. It will track the path of a casting from quoting through shipping. This course covers common metalcasting terms and highlights the activities inside the major departments of a metalcasting production facility.

8:30 – 9:30 a.m.

Room: 26ABC

SFSA Cast in Steel Competition

Presented by the Steel Founders Society, this student casting competition challenges college teams to perform all aspects of creating a new African spear point exploiting the casting manufacturing process from design conception to performance. Stop by to see these impressive projects and watch the annual awards presentation!

9:15 – 10:15 a.m.

Aluminum & Light Metals

Room: 22
Session Chair:

Steve Midson
Colorado School of Mines,
Golden, CO

Microstructure and Mechanical Properties of Cast Aluminum Pistons (23-050)

Andy Wang, Qigui Wang, Dale Gerard, John Yang, and Daniel Wilson, General Motors, Pontiac, MI

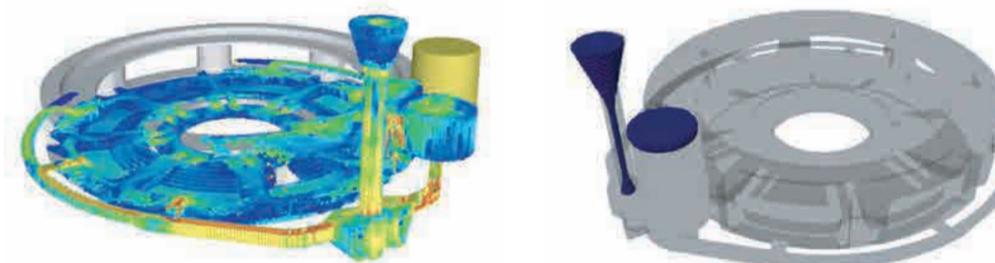
Cast aluminum pistons are commonly used because of their lightweight, excellent thermal conductivity, corrosion resistance, good castability and recyclability, etc. In this study, the aluminum pistons were made of an AlSi12CuMgNi alloy using gravity permanent casting process. Mechanical properties of the cast aluminum pistons were evaluated in terms of tensile, fatigue, creep, and Charpy impact at room temperature and 300°C. Metallurgical and fractographic analyses were employed to understand the relation between mechanical properties and multi-scale defect and microstructure. The results indicate that microstructure and especially casting defects play an important role in mechanical properties—particularly fatigue and tensile ductility. Increasing defect size reduces fatigue strength and life. Fatigue behavior of piston material can be predicted using multi-scale fatigue models together with the defect (pore) size in castings.

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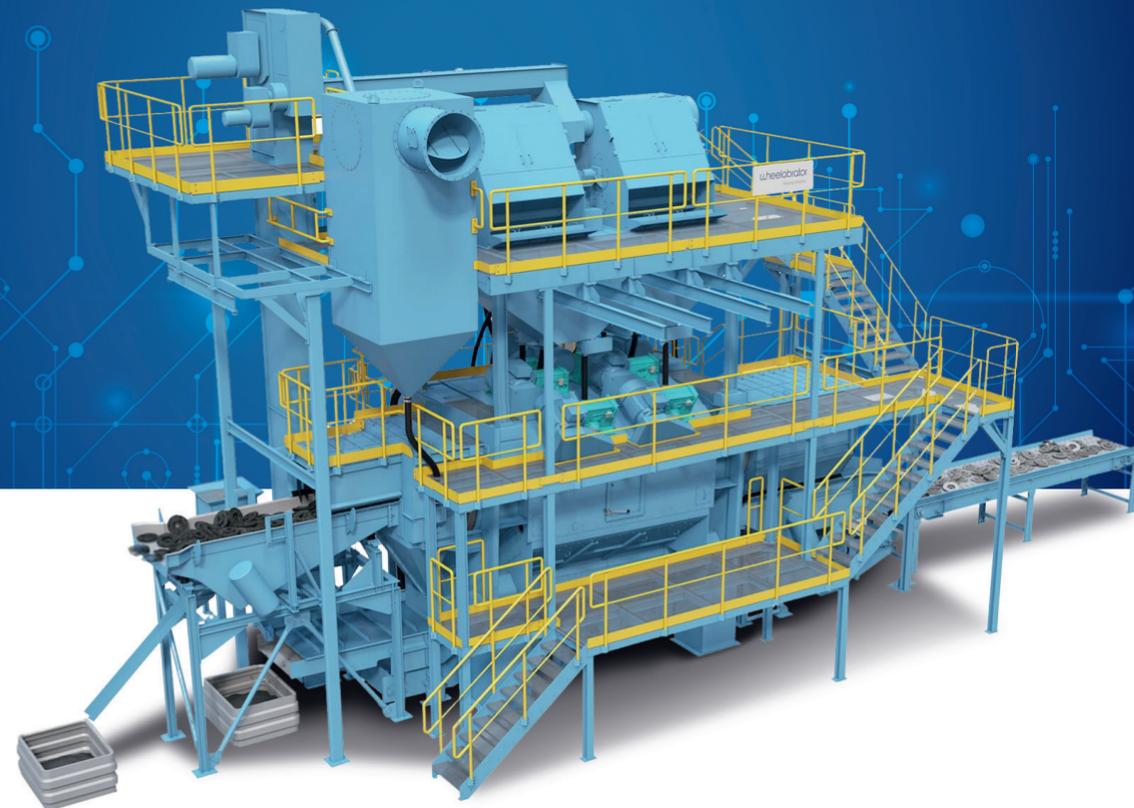
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Aluminum & Light Metals

Room: 22
Session Chair:

Steve Midson
Colorado School of Mines,
Golden, CO

Methodology to Remove or Scale Back the Solution Treatment in the Thermal Processing of the 319-Type Alloy Without Changing Material Properties (23-021)

Robert Mackay and Glenn Byczynski, Nemak US/CAN Business Unit, Windsor, Ontario, Canada

The 319-type alloy is one of the more widely used casting alloys for propulsion applications in the automotive space (i.e. e-motor housings for battery electric vehicles and engine blocks for internal combustion engines). For these 319-type applications that require the highest material properties, a T7 (solution and quench followed by an artificial over-age) is used. The presentation will demonstrate an innovative approach to investigate whether the solution treatment stage can be removed or scaled back significantly with adjustments in artificial age parameters, while achieving the same material properties and dimensional stability had a full solution treatment been used.

Melting Methods & Materials

Room: 21
Session Chair:

Mike Mutton
Larpen Metallurgical
Service, Ludington, MI

Panel: Channel Induction Furnace (23-132)

Refractory (23-132A)

Tim Hoyt, Allied Mineral Products, Inc., Columbus, OH

Ceramic Loop (23-132C)

Phil Geers, Blasch Precision Ceramics Inc., Menands, NY

Moisture in Refractories (23-132D)

Pat Leper, Saveway USA Corp., North Canton, OH

This is panel of industry experts from the Melting Methods and Materials Division Channel Furnace Subcommittee. The panel will review multiple areas of the channel furnace refractory systems, including new lining system designs, critical design factors, and the importance of the removal of moisture. Advantages and challenges of a new lining concept for the channel furnace inductor area will be reviewed.

Molding Methods & Materials

Room: 24
Session Chairs:

Brian Rachwitz
EJ, East Jordan, MI

Greg Jarski
American Colloid Co., Iron
Mountain, MI

Analysis of Disc-Shape Chemically Bonded Sand Specimens for Process Control in a Working Foundry (23-063)

Sam Ramrattan and Lee Wells, Western Michigan University, Kalamazoo, MI; Alberto Montenegro and Cynthia Morais, AMV, Madrid

The metalcasting industry has been using resin-coated chemically bonded sands to produce complex near-net-shape parts for over half a century. Despite these advancements, the casting industry still suffers from high scrap/rejection rates. A key contributor to these less-than-ideal yield levels is the inability to effectively monitor and/or evaluate the quality of incoming sand-binder systems. Research has shown that disc-shaped chemically bonded sand tests, such as thermal distortion testing (TDT), provide an opportunity for process control in a working precision sand system.

Molding Methods & Materials

Room: 24
Session Chairs:

Brian Rachwitz
EJ, East Jordan, MI
Greg Jarski
American Colloid Co., Iron Mountain, MI

Digital Measurements of Particle Size, Distribution, Shape, and Surface Area From Foundry Sands (23-064)

Sam Ramrattan, Western Michigan University, Kalamazoo, MI; David Myers, Sonny Singh, Gurdeep Singh, and Praveen Kumar Devaraj, Singh Automation, Portage, MI

The size, shape, distribution, and surface area of foundry sand have been critical factors controlling the quality of metalcasting. Current AFS standards for these measurements are analog and slow. Digital imaging technology for non-spherical shapes of particles influence the size and these measurements in turn affect surface area results depending on sand sample. A new approach employs three popular, non-parametric classification methods—namely classification and regression trees, the k-Nearest Neighbor, and the random forest techniques—and with computational power, quick measures are achieved. This presentation compares the standard approach (AFS 1105-00-S through 1109-00-S) using sieve testing (~ 30 minutes) to a new digital approach (~ 30 seconds) for measurements of AFS grain fineness, distribution, shape, and surface area.

1:30 – 3 p.m.

Cast Iron

Room: 23
Session Chairs:

Eric Nelson
Dotson Iron Castings, Mankato, MN
Kramer Pursell
Metal Technologies Auburn LLC, Columbia City, IN

Small, In-Line Passenger Vehicle Engines – Cast Iron With the Same Weight as Aluminum (23-071)

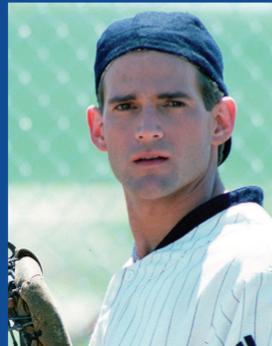
André Ferrarese and Carlos Cabezas, Tupy S/A, Joinville, Brazil; Steve Dawson, SinterCast Ltd., Sunninghill Berkshire, United Kingdom

In comparison to aluminum, compacted graphite iron (CGI) iron provides advantages related to mechanical properties, wear resistance, design freedom, NVH, package size, cost, and manufacturing CO2. Despite these advantages, aluminum cylinder blocks have benefitted from weight reduction to make considerable gains in the small, in-line passenger vehicle sector over the last 30 years. In order to demonstrate the potential benefits of CGI for small, in-line spark-ignition engines, the present study converted the cylinder block of a series production 1.2 liter, three-cylinder engine from aluminum to CGI. Leveraging a novel design concept, with the running surfaces and load path constructed from high-strength CGI and the outer crankcase housing fabricated from durable, lightweight plastic, the CGI cylinder block achieved the same weight as the original aluminum block. With weight parity, and the successful completion of a 100-hour durability test, CGI has established a new benchmark for small, in-line passenger vehicle engines.

10:30 – 11:30 a.m.

Keynote

Room: 26ABC



Fathers, Baseball and Field of Dreams (23-114)

Dwier Brown
Actor, Speaker, and Author

Ready for some inspiration? Dwier Brown appeared in one of the most popular movies of all time, Academy Award-nominated *Field of Dreams*, as the father of Kevin Costner's character. Although he has appeared in scores of films, television shows, and stage productions, including *The Thorn Birds*, *ER*, *Ally McBeal*, and *Murder: She Wrote*, Dwier is still best known for his inspirational "Wanna Have a Catch?" scene as Ray Kinsella in that film. Poignant stories from viewers about how the movie changed their own lives, and their relationships with their own fathers, led Dwier to write the moving memoir, *Build It and They Will Come: Fathers, Fate and Field of Dreams*. He also co-owns the Baseball Hall of Dreams in Dyersville, Iowa, not far from where the film was shot. Join us for this uplifting presentation.

Real World Results From Full Process Optimization: How AI Combined With Application Knowledge Are Driving Scrap Reduction and Sustainability in Cast Iron Foundries (23-091)

Derek Yesmunt, DISA Industries Inc., LaGrange, GA

Reducing scrap and increasing process efficiency greatly impacts foundry profitability and emission reduction. But manual analysis can't cope with the complex interactions across an entire green sand-casting process. This presentation will discuss how service-based Artificial Intelligence and machine learning software is now a mature and proven route to full process optimization and how it can quickly be implemented following IIoT system deployment. Topics addressed will include: The limits of manual optimization, IIoT-based data collection, including energy and emissions monitoring, data synchronization and timestamping, predictive model building, and real-time optimization and process control. The presentation will also provide named case study examples of successful AI-driven optimization implementations and detailed results from four green sand foundries in China, the UK, Japan, and Spain.

11:45 a.m. – 1:15 p.m.

Special Event

Room: 25BC

Volunteer Leadership Awards Luncheon

Join us for a fun, fast-paced awards luncheon, which combines the former Division Luncheon and President's Business meeting. Catch up with friends while AFS officers welcome four new board members. The AFS Technical and Management Division chairs will also present key national and divisional awards.

Examples of Chunky Graphite Formation in Production of Ductile Iron Castings and Effective Countermeasures (23-055)

Haruki Itofuji, Adstefan Casting Solution Center, Yamaguchi, Japan; Yutaka Miyamoto, Ube Steel Co. Ltd., Yamaguchi, Japan; Keita Iwakado, Ohtachuzousyo Co. Ltd., Hiroshima, Japan

Papers since 1956 on chunky graphite formation in ductile iron castings were reviewed. Analyzing papers through site theory, the causes were summarized, and the countermeasures were designed. The site theory can explain not only graphite spheroidization but also its degeneration. The results reviewed were applied in foundry practice. In this presentation, the examples of chunky graphite formation and the effective countermeasures are introduced. The site theory helped to understand complex phenomena of chunky graphite formation. In fact, it was effective to avoid degenerate graphite in foundry practice.

Copper

Room: 20
Session Chair:
 Jacob Johnson
 Foseco, Brook Park, OH

Retrofit of a Manual Pouring System With an Assisted Pouring Device in a Copper Jobbing Foundry (23-051)

Ryan Showalter, Fresno Valves & Castings Inc., Selma, CA

Complex castings can require specific pouring rates with minimal allowance for deviation to produce a sound casting free of defects. In the modern foundry, this requirement has been met by automated pouring ladles, which can deliver a consistent rate of pour for every mold. However, retrofitting traditional automated pouring ladles into existing foundries is not always practical. For this presentation, the feasibility of creating and retrofitting an "assisted" pouring device was investigated in a copper alloy jobbing foundry, which gives the ladle operator real-time feedback on the rate of pour and current metal temperature inside the ladle. The effectiveness of the device was determined by comparing the resulting scrap counts of castings poured using assistance from the device to the scrap counts of an operator who poured the same castings without the assistance of the device.

Engineering & Smart Manufacturing

Room: 22
Session Chair:
 Jim Wenson
 Sinto America, Grand Ledge, MI

How Mfg. 4.0 Can Help Foundry Industry Provide Supply Chain Resiliency (23-015)

Jerry Thiel and Nathaniel Bryant, University of Northern Iowa, Cedar Falls, IA; Rich Lonardo, Youngstown Business Incubator, Youngstown, OH

The foundry industry has seen its share of difficulties in recent years. Economic and environmental issues, along with failing to keep up with technology, has played a major role in reducing the number of foundries in the U.S. The largest issue in the industry may be the lack of a workforce that is either prepared for heavy manual labor or technologically skilled to benefit from the tremendous advances in manufacturing technology. This presentation explores what technologies have the best chance to advance the metalcasting industry and what efforts are being made to support improvements in the casting supply chain resiliency. Technologies including smart manufacturing, robotic casting finishing, automation, and additive manufacturing and how they can be applied to a legacy manufacturing process to provide sustainability and competitiveness for the foundry industry are explored. The decision by foundries to adopt the new technologies is supported by providing business case assistance and education.

Engineering & Smart Manufacturing

Room: 22
Session Chair:
 Jim Wenson
 Sinto America, Grand Ledge, MI

Failure Analysis of Large Castings Used in Mineral Ore Processing (23-009)

Daniel DeMiglio, ME Global, Minneapolis, MN

A wide range of iron and steel liner castings (≤ 12 tons) are used to process mineral ores by primary/secondary crushing, semi-autogenous grinding (SAG) and ball milling. Case histories will be presented on large white iron and alloy steel castings that either fractured prematurely or did not perform as designed during mineral ore processing. Tools and techniques commonly associated with metallurgical failure analysis are discussed as they relate to the examination of large castings. Lessons learned from each case history were used to identify ways to avoid future failures. Experience gained by proper investigation is useful for conducting more timely and relevant failure analysis work.

Obtaining Perfect Critical Automotive Safety Components Through Behavioral Monitoring and Simulation Using Digital Twins (23-012)

Javier Nieves, PhD, Argoitz Zabala, and Benat Bravo, Azterlan, Durango, Spain

With the aim of obtaining the perfect component and manufacturing process without defects or claims, an ecosystem of applications is created. Each creates a virtual representation of the behavior that occurs in their control area. In this way, a group of predictive control models provides a way to anticipate potential manufacturing problems. Different software developments are responsible for extraction, digitization of the current situation, and providing a plausible solution that avoids the problem detected.



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Melting Methods & Materials

Room: 21
Session Chair:

Lucas Dix
ProFound Alloys LLC,
Birmingham, AL

Panel: Coreless Induction Furnace (23-133)

Induction Furnace Maintenance (23-133A)

Mark Kohler, AJAX Tocco Magnethermic Corp., North Canton, OH

Advancements in Computer and PLC Controls Included Cloud Based Systems (23-133B)

Robert Keshecki, Inductotherm Corp., Rancocas, NJ

New Sintering Process (23-133C)

Dave Lazor, AJAX Tocco Magnethermic Corp., North Canton, OH; Ben Hunsicker, Allied Mineral Products, Inc., Columbus, OH

This is a panel of industry experts from the Melting Methods and Materials Division Coreless Furnace Committee. Topics to be presented involve relevant information on current coreless furnace melting practices. Industry best practices for the mechanical maintenance of coreless furnace systems (structural, hydraulic, and water systems) will be reviewed, along with the latest Computer and PLC monitoring programs, including options for cloud-based systems. The sintering of new refractory linings will be discussed in depth, including new information from a comprehensive thermocouple monitoring program on a large-scale coreless furnace.

Steel

Room: 24
Session Chair:

Dr. Robert Tuttle
Western Michigan
University, Kalamazoo, MI

Cast a High-Performance Stainless-Steel Sword Using Machinable Mold Media (23-059)

Sean M. Derrick and Sam Ramrattan, Western Michigan University, Kalamazoo, MI

The Steel Founders Association of America's (SFSA) Cast-In-Steel student competition is a yearly competition to encourage students to learn about steel casting products and processes while applying the latest technology available to do so. During the 2022 competition year, the competitors were charged with casting a fully functional Celtic Leaf Sword. During the competition, a new mold-making process was utilized by the Western Michigan University (WMU) Team to produce their functional blade in 440C stainless steel. Rather than using conventional processes, the WMU team used a unique machinable mold material being researched at the university to cast the sword patternlessly and at near-net-shape. The process involves subtractive machining to generate patternless large format molds in a comparable or shorter time than would be required to 3D-print a conventional pattern or patternless mold. This competition sword represented the first proof of concept trial of this process in a ferrous alloy.

Growth Kinetics and Development of the Solid-Liquid Interface in Low Carbon and High Alloy Steel Castings Enabled by Confocal Microscopy (23-094)

Katie Kiser, Laura Bartlett, Viraj Athavale, and Mario Buchely, Missouri University of Science & Technology, Rolla, MO

High-Temperature Laser Scanning Confocal Microscopy (HT-LSCM) is an in-situ technique that can be used for direct observation of microstructural phenomena resulting from different heat treatments or cooling processes in the solid state. This technique is also utilized for observing the melting and solidification behavior of metallic materials. This tool is therefore a powerful method to understand how cooling conditions affect the solidification structure and degree of alloy segregation in steel castings. In the current study, HT-LSCM was utilized to observe the melting and solidification phenomena of a low carbon steel, as well as high alloy austenitic manganese steel, as a function of thermal gradient. The growth kinetics and evolution of the solid liquid interface during solidification were derived from time lapse videos. The resulting solidification microstructure and degree of alloy segregation was determined utilizing scanning electron microscopy coupled with energy dispersive X-Ray analysis.

Steel

Room: 24
Session Chair:

Dr. Robert Tuttle
Western Michigan
University, Kalamazoo, MI

In-depth Analysis of Steel Cooling Curves (23-066)

Dr. Robert Tuttle, Western Michigan University, Kalamazoo, MI

Computer simulation plays a consequential role in preventing defects in the casting process. Increasingly, foundries require better data for the steels they are producing to predict these defects more accurately. Thermal analysis can provide several pieces of data to improve casting simulations; however, the techniques for steel have not been fully developed. To address this, a heat of 4130 steel was cast into a thermal analysis cup. The resulting curve was analyzed in detail using the R programming language. Several zero curve methodologies were examined. The fraction solid curve was determined, and the dendrite coherency point was also measured. These measurements should provide better data for integrating into casting simulations and improve porosity prediction. Furthermore, the shape of the fraction solid curve observed departed significantly from thermodynamic predictions. This departure was thought to be due to segregation within the sample.

1:30 – 4:45 p.m.

AFS Institute Course

Room: 19

Metalcasting Process Basics – Part Two (23-115)

Patrick Kluesner, Grede Castings, Southfield, MI

This course provides participants with a basic overview of the metalcasting process. It will track the path of a casting from quoting through shipping. This course covers common metalcasting terms and highlights the activities inside the major departments of a metalcasting production facility.

3:15 – 4:45 p.m.

Aluminum & Light Metals

Room: 24
Session Chair:

Adam Kopper
Mercury Marine,
Fond du Lac, WI

Impact of Temperature on Cast Iron Chills on Tensile Properties in Aluminum Precision Sand Casting Process (23-020)

Robert Mackay and Glenn Byczynski, Nemak US/CAN Business Unit, Windsor, Ontario, Canada

The latest generation of high-performance cylinder blocks are produced with the precision sand castings process (PSCP) which sometimes uses a monolithic cast iron chill that promotes enhanced solidification conditions that improve both tensile and fatigue performance. However monolithic chills tend to be re-used quite quickly and thus can be significantly above room temperature during the next subsequent casting. To deter potential deleterious effects this may cause, most casting practitioners enforce a strict room temperature condition of the chill prior to use; however this may necessitate a higher number of chills in the system or the implementation of chill cooling stations, both of which involve higher capital cost.

Aluminum & Light Metals

Room: 24
Session Chair:

Adam Kopper
Mercury Marine,
Fond du Lac, WI

Ruby Anniversary Lecture: Theoretical and Practical Aspects of the Modification of Al-Si Alloys (23-140)

Geoffrey Sigworth, Harrisonburg, VA

Several methods have been used to modify Al-Si casting alloys. The history of their use is considered, together with the important technical and commercial reasons why some are no longer used. The benefits and possible disadvantages of each modifier are also considered, and recommendations are given for best practices.

Government Affairs

Room: 20
Session Chair:

Eric Meyers
Oil City Iron Works, Inc.,
Corsicana, TX

Panel: Hot Topics – Top 5 Issues Facing U.S. Metalcasters From Washington, D.C. in 2023 (23-137)

Eric Meyers, Oil City Iron Works, Inc., Corsicana, TX; Stephanie Salmon, AFS Washington Office, Washington, D.C.

We start 2023 with a new Congress and an aggressive rulemaking agenda from the Biden-Harris administration. During this session, we will explore the top five pivotal national issues that will impact the metalcasting industry in 2023 and beyond, as well as what your business can do to prepare for these new challenges.

It is more important than ever for policymakers to understand the impact their choices will have on our industry's future. Learn how AFS is actively working with members of Congress and key regulatory staff on critical issues

Lost Foam

Room: 23
Session Chair:

Jacob Belke
Mercury Marine,
Fond du Lac, WI

An Investigation of the Viability of Printed Lost Foam Tooling AFS Project 17-18 #03 (23-025)

Marshall Miller, 3D Systems, Rock Spring, GA

This project is the result of 3D printed lost foam molds in aluminum, titanium, filled polymers and ceramic materials engaging the additive processes of powder bed metal printing, material extrusion, and stereolithography. Results include actual casting of the patterns, dimensional results of the tools after use and cycle time. Additionally, the costs of the printed molds are compared against standard subtractive costs showing the cost advantage.

An Investigation Into Producing Lost Foam Stainless Steel in ASTM A351 Grade CF8M (23-026)

Marshall Miller, 3D Systems, Rock Spring, GA

This project was developed to determine the viability of producing ASTM A351 Grade CF8M. Lost foam is utilized in many industries, particularly for pumps and valves. CF8M is cast primarily in the investment and chemically-bonded sand processes, making it a large potential market where the lost foam process can improve margins by reducing weight and adding features. Lost foam properties—such as coatings, pattern bead, pour times, pouring temperatures, and sand properties—were tested at foundries—not a laboratory—on an international scale. Chemistry, integrity, mechanical properties, and microstructure of the castings were tested to determine the viability of the process for producing CF8M. Gating simulation was also performed, and diagrams provided potential prediction of the best gating options. The results show that there is a strong potential to produce CF8M.

Loss of Kinetic Zone Pressure Causes Mold Wall Collapse During Filling Across a Glue Joint in Lost Foam Casting (23-027)

Keaton Allen, Missouri University of Science and Technology, Bartlesville, OK; Jacob Belke, Mercury Marine, Oshkosh, WI

Mold wall collapse in the lost foam casting process has been associated with poor sand compaction where pattern design and glue line placement has been overlooked. In this study, the design and location of glue joints is examined for its roll in mold wall collapse by measuring the time for the metal front to pass through a directional glue joint. Using high-temperature glass, the flow of the metal and the kinetic zone was tracked with a high-speed camera, and thermocouples were used to measure the time and temperature of the metal front. It was found that location of glue joints and glue type can cause sand collapse in addition to poor sand compaction.

Melting Methods & Materials

Room: 21
Session Chair:

Alex Croll
Waupaca Foundry, Inc.,
Tell City, IN

Cupola Computer Simulation Reconciliation and Analysis – CRI/CSR Cupola Coke Trials (23-134)

Dave Kasun, Kuttner North America, Port Washington, WI

During the second round of coke testing, key process parameters of cupola operation were collected and verified. A comprehensive mass-energy balance of the cupola melting process was performed using cupola computer simulation software to reconcile the calculated metallurgical and energy conditions of the cupola with the field observations of resultant spout chemistry, charge materials, coke properties and cupola efficiency, to the extent possible.

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Melting Methods & Materials

Room: 21
Session Chair:

Alex Croll
Waupaca Foundry, Inc.,
Tell City, IN

Update on AFS Research Project #20-21#03: Low CRI, High CSR Coke Cupola Trials (23-135)

Steve Hay, Hay Melting Solutions LLC, South Lyon, MI; Bruce Blatzer, Cary, NC

Foundry trials for AFS Research Project #20-21#3 are now complete. The original proposal was to test a coke with different properties from normal foundry coke to ascertain suitability of such coke in a cupola. This low CRI, high CSR coke commonly known as blast furnace coke was tested in a production cupola over two and a half days. The test procedure, materials consumed, data collected, and results will be presented.

Molding Methods & Materials

Room: 24
Session Chairs:

Pete Gravunder
Badger Mining Corp,
Berlin, WI

Mitchell Patterson
HA International LLC,
Cedar Falls, IA

Panel: That's Green Sand Molding (23-090)

Tom Arenholz, John Deere Foundry
Waterloo, Waterloo, IA (23-090A)
Brian Rachwitz, EJ, East Jordan, MI (23-090B)
Al Jacobson, American Colloid Co.,
Hoffman Estates, IL (23-090C)
Michelle Ring, Norican Group,
Carmel, IN (23-090D)
Chuck Gerth, Amsted Rail,
Granite City, IL (23-090E)

Five green sand experts compete on their knowledge of green sand basics. Are you smarter than the sand gurus? This presentation will highlight many of the basics of green sand, including testing, defects, and process control and end with the crowning of our Green Sand Champion 2023. Whether they've been running a sand system for decades or are just getting started, every attendee will walk away with new knowledge on green sand.

6-7 p.m.

Special Event

Hilton Hotel -
Center Street BC

Annual Banquet Reception
(Cashless bar)

Join us for a memorable evening with friends new and old.

7-9 p.m.

Special Event

Hilton Hotel -
Hope DE Ballroom

Annual Banquet
(Ticketed Event - \$125)

Join us for business networking and the presentation of the highest AFS honors, the Gold Medals. The cashless bar opens at 6 p.m. The awards presentation and banquet start at 7 p.m. The President's After Party starts at 9 p.m. *Recommended dress is business formal.*

9 p.m.

Special Event

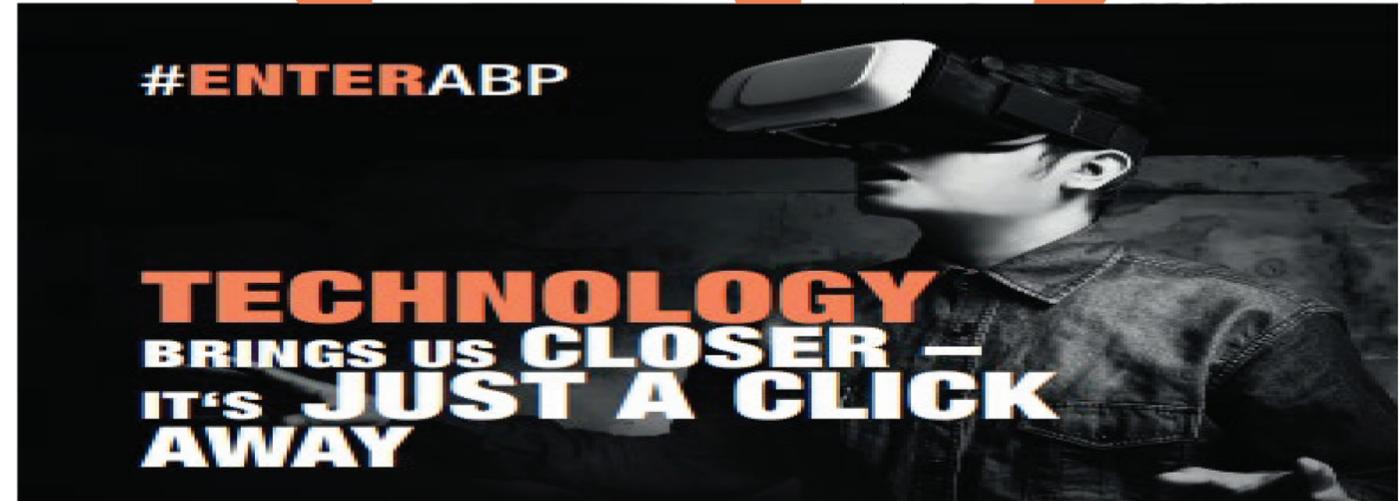
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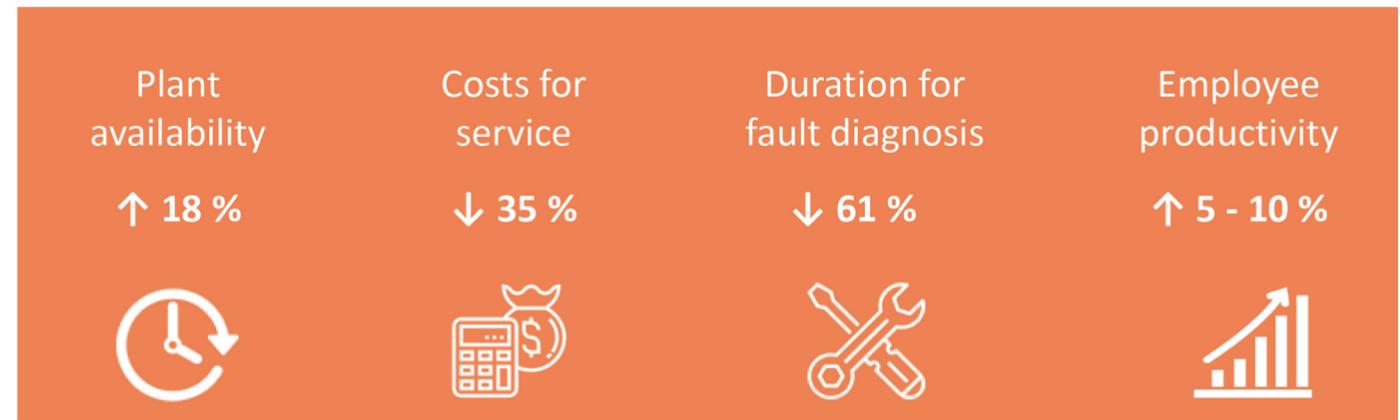
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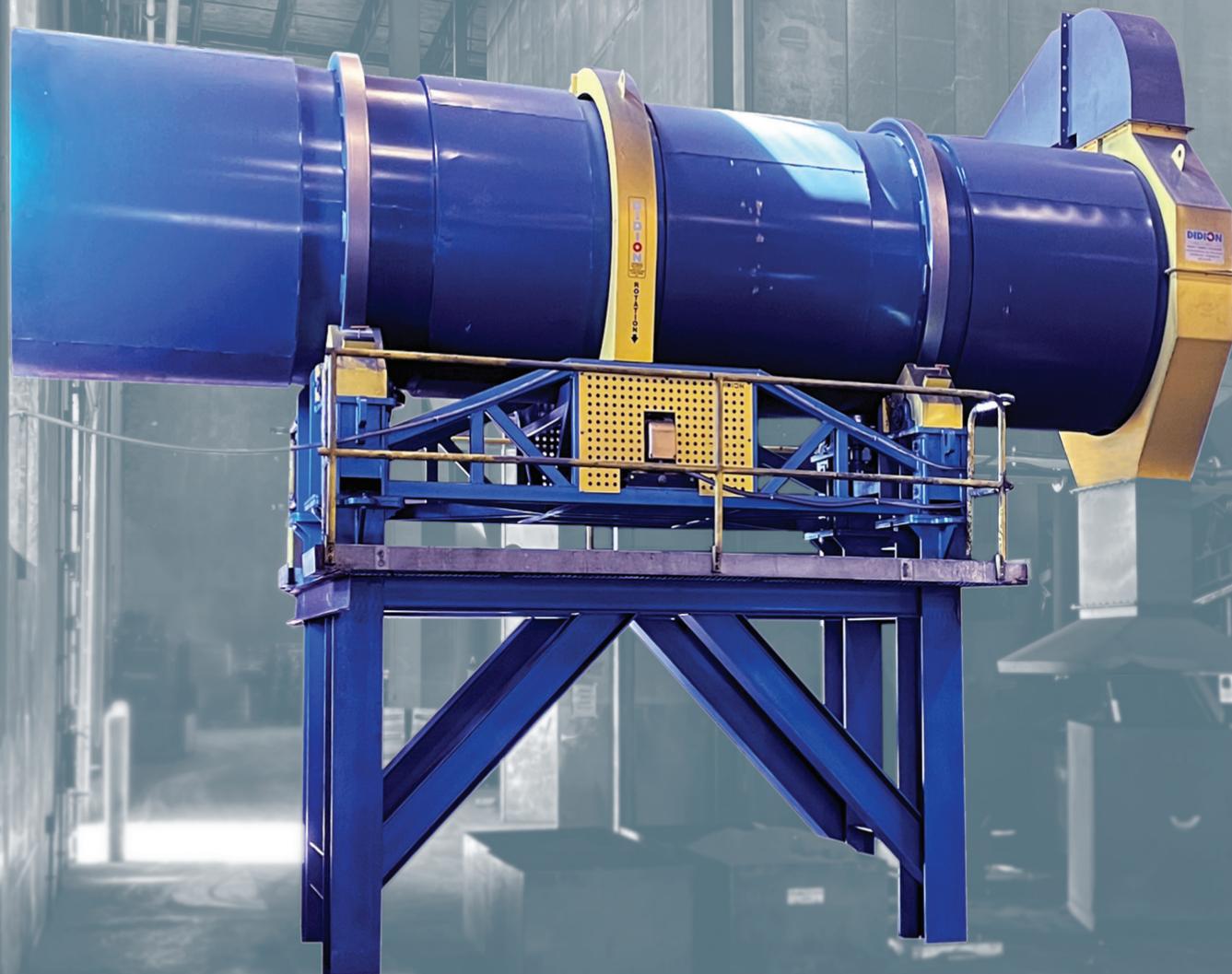
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Wednesday, April 26, 2023

7 a.m.

Room: 16

Author Chair Breakfast

This breakfast is for AFS speakers, session chairs, students and staff to meet and coordinate details for the day's educational sessions.

7:30 – 9 a.m.

Special Event

Women in Metalcasting Breakfast

Room: 16

Featuring breakfast, networking, the presentation of the 2023 Women in Metalcasting Award for Excellence, and the Jean Bye Women in Metalcasting Scholarship. Also featuring guest speaker Sarah Eppink from Aisling Group, LLC. Sarah will present Owning Your Development, a talk focused on understanding the three types of skills necessary for career success, developing your strategic skills, and applying your strategic skills in your current role. For more information, contact the WIM liason, Katie Matticks, at kmatticks@afsinc.org. *Must be registered to attend this event.*

Sponsored by:



8 – 9 a.m.

Aluminum & Light Metals

Room: 22
Session Chair:

Jose Macedo
General Electric Co.,
Cincinnati, OH

Development of a New Al-Fe-Ni Alloy for Electric Vehicles Application (23-035)

Lei Pan, Francis Breton, and Jerome Fourmann,
Rio Tinto, Quebec, Canada

The electrification of automotive is growing which has driven up the need for high electrical conductivity aluminum alloy. The core element of the electric vehicle, apart from the batteries, is an electric motor, which replaces the internal combustion engines of a traditional gasoline vehicle. These applications require both high strength and high electrical conductivity. This presentation covers the development of a new Al-Fe-Ni aluminum alloy that provides a good combination of mechanical properties and electrical conductivity. The alloy is well suited for high-pressure vacuum diecasting. The as-cast microstructures, mechanical properties, and electrical conductivity were studied for alloys with different Fe/Ni ratios. The relationship between the microstructure and properties is analyzed and the strengthening mechanisms of the studied alloy are discussed. Based on the experimental results, the new alloy demonstrates an excellent potential for electric vehicle application produced by high-pressure vacuum diecasting.



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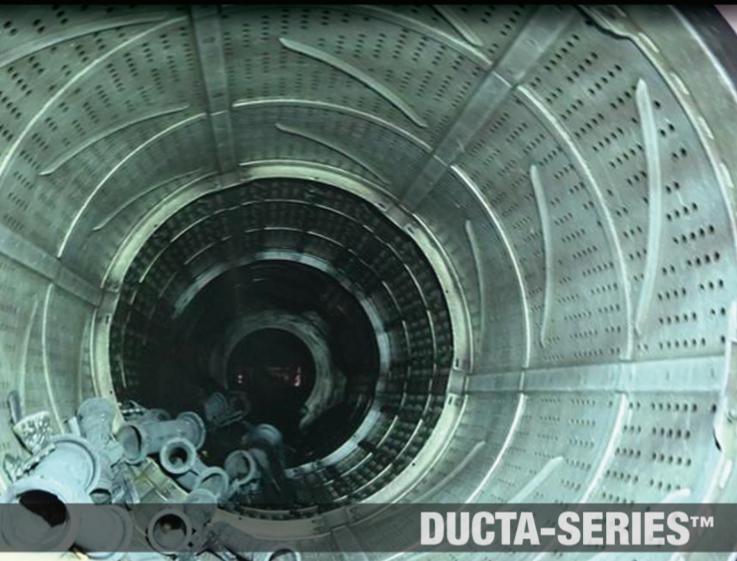


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Aluminum & Light Metals

Room: 22
Session Chair:

Jose Macedo
General Electric Co.,
Cincinnati, OH

Role of Mn, Cr and Sr in the Formation of Fe-containing Intermetallic Phases in Secondary Aluminum Alloys (23-038)

Nagasivamuni Balasubramani, PhD, Alan Luo,
Michael Moodispaw, and Gabriel Garcia, The
Ohio State University, Columbus, OH

Al-Si-Fe based intermetallic phases often solidify as needle/platelet morphology (β -phase) in secondary Al-Si based alloys with high Fe contents, which can significantly reduce the mechanical properties of cast components. Additions of Mn and/or Cr have been known to mitigate the harmful effects of β -phase by promoting the formation of a less detrimental α -phase. For Si modification, Sr addition has been well-documented; however, the effect of Sr on Fe-intermetallic phases is elusive. This study investigates the formation of Fe-intermetallic phases with combined additions of Mn, Cr, and Sr in Al-Si-(0.6 and 1.0 wt.%) Fe alloys as a function of cooling rate. Thermodynamic simulations using the CALPHAD approach have been applied to understand the phase fraction and the formation temperatures of intermetallic phases. The critical ratio of Fe/(Mn, Cr) and the presence of Sr affecting the morphological transformation of Fe-intermetallic phases are discussed.

Cast Iron

Room: 23
Session Chairs:

Mike Riabov
Elkem Silicon Products,
Appleton, WI
Leonard Winardi
Charlotte Pipe & Foundry
Co., Charlotte, NC

Welding of Gray and Ductile Iron (23-011)

Trevor Beach, Betz Industries, Grand Rapids, MI

In this presentation, methods and practices for welding gray and ductile cast iron are shared. Included are some examples of structural welds of cast irons as well as welding mild steel to cast iron. Friction welding of cast iron to other metallic materials is also covered. The presentation provides some references on where to go for more information on welding cast irons.

The Influence of Blind Riser Geometry on Feeding Behavior in Cast Iron (23-043)

Konstantin Nikolov, Magma Foundry
Technologies Inc., Schaumburg, IL

Many iron foundries utilize blind risers in both horizontally- and vertically-parted molding processes. Often, the shape of the pipe or void at the top of the blind riser will be used as a visual inspection method to assess how well the riser has performed. This presentation will highlight why this practice of examining the riser pipe on blind cast iron risers can sometimes be misleading due to the dynamic nature of iron solidification. This work will also take a close look at how the geometries used at the top of the blind riser, usually designed with the goal of keeping the top of the riser liquid longer, can influence riser performance. The shape and size of those elements will be studied through casting process simulation.

Environmental, Health & Safety

Room: 23
Session Chair:

Craig Schmeisser
Mad River Strategies LLC,
New Bremen, OH

Panel: EHS Hot Topics (23-128)

Air Quality (23-128A)

Jeet Radia, McWane, Inc., Birmingham, AL

Water, Waste & Byproducts Management (23-128B)

Bryant Esch, Waupaca Foundry Inc.,
Waupaca, WI

Safety & Health (23-128C)

Brent Charlton, Metal Technologies, Inc.,
Auburn, IN

Hear from EHS committee leaders on current topics in environmental, health and safety for foundries.

Melting & High Entropy Alloy Session

Room: 21
Session Chair:

Pete Satre
Allied Mineral Products, LLC, Columbus, OH

Casting, Forging, and Hot Rolling of High-entropy Alloy Ingots (23-010)

Delin Li, CanmetMATERIALS, Hamilton, Ontario, Canada

Conventional alloys such as aluminum, copper, iron, and magnesium have one principal element mixed with relatively small quantities of others. Unlike conventional alloys, high-entropy alloys (HEAs) have no single dominant element and typically use five or more metals mixed in roughly equiatomic proportions. This group of alloys is also referred to as multi-principal element alloys (MPEA) or complex concentrated alloys (CCA). There have been copious studies on HEAs since the first few papers were published in 2004. HEAs can exhibit exceptional materials properties. In this work, a separate melting method was employed to cast large ingots of Al-contained HEAs such as AlCoCrFeNi and AlCoCrFe-Ni2.1. The HEA samples were subsequently processed through forging, hot rolling, and vacuum arc remelting to explore new microstructures and material properties.

Additive Manufacturing

Room: 21
Session Chair:

Dave Rittmeyer
Matthews International Corp., Pittsburgh, PA

Considering the Effects of Thermo-Mechanical Anisotropy in 3D Printed Silica Sand Molds (23-045)

Dr. Sam Ramrattan, Dr. Robert Tuttle, Dr. Lee Wells, and Juan Wei Foo, Western Michigan University, Kalamazoo, MI

3D printing provides the flexibility and ease of producing sand molds directly from CAD models. This eliminates the laborious pattern making steps, thus reducing total production time. Furthermore, 3D printing has the capability to produce complex shaped sand molds, thinner walls, and no draft. This study evaluated the thermos-mechanical properties based on horizontally or vertically printed disc-shaped specimens. The print orientation has a significant effect on longitudinal and radial displacement, and heat transfer properties. This indicates that 3D printed specimens have anisotropic characteristics caused by print orientation, which could result in unanticipated dimensional changes that lead to part rejection. Results of thermal distortion curves that show these anisotropic characteristics are provided.

8 – 10:15 a.m.

AFS Institute Course

Room: 19

The 10-Step Method for Corrective Action – Part One (23-117)

Patrick Kluesner, Grede Castings, Southfield, MI

Participants will be introduced to a basic overview of a casting defect analysis procedure. Course topics will include an introduction to the 10-step method for casting defect identification, how to compose a problem statement, a discussion on the importance of recording process parameters, an introduction to navigating the “International Atlas of Casting Defects,” and a path to identifying the correct defect and its root cause for corrective action. Learning a systematic procedure for root cause identification supports the business goal of designing, producing, and selling quality castings in a timely manner in a safe environment at a profit.

Aluminum & Light Metals

Room: 22
Session Chair:

Anthony Lindert
Oshkosh Corporation, Oshkosh, WI

Novel Experimental Method for Metal Flow Analysis Using Open Molds for Sand Castings (23-127)

Guha Manogharan and Philip King, Pennsylvania State University, University Park, PA

Recent innovations in additive manufacturing have allowed for more complex mold and rigging designs to produce higher quality castings. One of the limiting factors preventing widespread adoption of these complex designs, however, is the inability to fully visualize and characterize the metal flow in these molds. This presentation examines the use of novel open molds to evaluate liquid metal flow. Two types of open molds were used along with two types of cameras to find the best method for evaluating the flow.

9 a.m. – 6 p.m.

Hall C

Exhibits Open

9:15 – 10:15 a.m.

Additive Manufacturing

Room: 21
Session Chair:

Dave Rittmeyer
Matthews International Corp., Pittsburgh, PA

Effect of Resin Viscosity on the Physical Characteristics of 3D Printed Sand (23-006)

Nathaniel Bryant, University of Northern Iowa, Cedar Falls, IA

3D sand printing has continued to emerge as a topic of significant interest to the foundry industry. While this process uses materials similar to traditional chemically bonded molding practices, some required characteristics of the binders used in 3DSP are unique to the binder jetting process. The University of Northern Iowa has investigated two samples of furfuryl alcohol of varying viscosity for 3D sand printing applications. One resin sample's viscosity was within the recommended operating range of the printhead used, while the other was below. It was found through a series of both standardized and non-standardized tests that the fluid viscosity was a significant factor influencing the strength and resolution characteristics of the printed samples. The higher viscosity resin yielded samples with lower strength but high resolution, and the opposite trend was observed for the low viscosity resin.

Copper

Room: 23
Session Chair:

Buddy Barnhill
Lee Brass Co., Anniston, AL

Developing the Natural Filling Technique (23-032)

Evan Letourneau, MAGMA Foundry Technologies, Inc., Schaumburg, IL

Natural filling is a novel technique that aims to streamline gating systems using casting simulation data. The technique uses a simulation to identify dead-zones in existing runner systems and then export a model with the dead-zones trimmed out. This has the potential to reduce turbulence in the runner system and can be done automatically rather than by trial and error. The technique can even be repeated multiple times to create an effect similar to topology optimization in FEA software. The natural filling technique is still in early development but shows promise for improving existing gating systems and potentially generating gating systems from scratch.

Marketing

Room: 20
Session Chair:

Cara Lynch
Inductotherm Corp.,
Rancocas, NJ

The Integrated Casting Order Network (ICON) (23-083)

Sheila Rayburn, Non-Ferrous Founders Society,
Sturgis, MI

ICON provides a procurement solution to buyers responsible for acquiring castings needed by our nation's defense and military customers, domestic foundries and diecasters. The program has made a major contribution to reducing administrative and production lead times (PLT/ALT) and in acquiring needed metal castings—many times at a lower total cost to the government through the use of existing tooling and available industry capacity. ICON is a web-based resource created to simplify the procurement process for cast parts by leveraging the integration of the nation's largest database of existing, defense-related tooling, a casting supplier database of foundries that manufacture parts for the defense industry, a tooling locations cross reference to suppliers and a solicitation review process to quickly identify government procurements for cast components and direct them to capable metalcasting facilities.

Molding Methods & Materials

Room: 24
Session Chair:

Scott Giese
University of Northern Iowa,
Cedar Falls, IA

An Assessment of South African Chromite Sand Crushing Ratio (23-016)

Jonathan Kabasele and Kasongo Nyembwe,
University of Johannesburg, Johannesburg,
South Africa

Mechanical reclamation is the de facto method of sand recycling in most foundries used to limit sand dumping and adhere to environmental regulations. The latter metalcasting imperatives align with the United Nations Sustainable Development Goals of Responsible Production (Goal 12). The crushing ratio, which essentially assesses the propensity of the sand to produce fine particles during molding operations, is a critical property to predict the effectiveness of the mechanical reclamation process. This study assesses the crushing ratio of South African chromite sand. Five samples from the top worldwide producers were evaluated and compared. Rod milling was used to simulate mechanical reclamation. After testing, it was found that this crushing ratio varies between 1.68 and 1.93 after 9 minutes. Good statistical linear correlations were established between the crushing ratio of samples with Cr:Fe ratio, spinel content, grain size. The investigation contributes to additional knowledge of chromite sand for foundry applications.

Chromite Sand as a Replacement for Zircon and Zircon/Silica Sand in Shell Applications (23-013)

Kelley Kerns, HA International, LLC, Westmont, IL; Robert Steele, FACT, Ponte Vedra Beach, FL; Patricia LaFay and Victor LaFay, Common Sense Applications, Cincinnati, OH

Chromite sands are a suitable replacement for zircon sand and zircon/silica sand blends in the core room. This presentation will review the impact that screen distribution, mineral characteristics and other parameters has on this design concept to produce a high-quality metal casting.

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9:15 – 9:45 a.m.

**Specialty
Engineering & Smart
Manufacturing
Division Session**

**Room: Casting
Source Theater
Session Chair:**

Shannon Wetzel
*American Foundry Society,
Inc., Schaumburg, IL*

**From the Forthcoming
Publication: Equipping
Engineering to be
Effective (23-106)**

Ted Schorn, Enkei America, Inc., Columbus, IN

Foundries utilize process and/or quality engineers often with vague descriptions of their role. Sometimes they see their job as simply, "keeping things running smooth" or "making things better." This can mean a very incomplete understanding of what is needed and cause confusion as to how the engineers relate to other support resources. In Process Control for Engineers, Schorn first takes up the important task of sorting out what process and quality engineers ought to be doing and how they should relate to one another and the rest of the organization. Grasping these roles with clarity permits both accountability and competence development.

9:30 a.m. – 5:30 p.m.

Hall C - AFS HUB - 423

**Foundry-in-a-Box
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Stop by and get "hands-on" by making your own casting. See how AFS conducts outreach with its customized Foundry-in-a-Box kit.

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9:50 – 10:15 a.m.

**Sponsored
Presentation**

**Room: Casting
Source Theater**

**OMEGA MDS CP46 –
An Imaginative Sand
Printing System**



At CastExpo 2022, Omega shared their thoughts on using 3D sand printing technology to push industry boundaries. Since then, Omega MDS has continued to develop a revolutionary printing system. By simplifying, minimizing cycle times, and changing logistics and material handling, the CP46 increases throughput and improves reliability. Join us to hear about the Omega MDS difference and why you should consider integrating this printer into your foundry. Proudly made in North America. Available worldwide.

10:30 – 11:30 a.m.

Hoyt Memorial Lecture

Room: 26ABC



Innovate or Die (23-103)

John "Chip" Keough
Joyworks LLC, Ann Arbor,

When all inputs are included, energy is over half of the cost of manufactured goods. All metal components start as castings. Metalcasting is the lowest energy, most direct manufacturing line from metallic ores to metal products. The metalcasting industry is the largest recycling body on the planet. However, the metalcasting industry is slow to develop and deploy new products and methods. With Industry 4.0 upon us, we must "Innovate or Die."

A pioneering metalcasting entrepreneur and dedicated mentor, Hoyt Lecturer John "Chip" Keough is chairman of LightSpeed Concepts Inc. and president of Keotech Inc. (Albion, Michigan), and former adjunct professor to University of Michigan's Materials Science and Engineering Department. He received the 2005 AFS Award of Scientific Merit and the 2014 Foundry Educational Foundation E. J. Walsh Award. In 2018, he received the AFS Pangborn Gold Medal, the society's highest honor. Presented annually since 1938, the Hoyt Lecture is one of the industry's most prestigious addresses.

1:15 – 1:45 p.m.

Casting Designers & Buyers

Room: Casting Source Theater
Session Chair:

Shannon Wetzel
American Foundry Society, Inc., Schaumburg, IL

Evaluating When to Reshore (23-121)

Tom Kayser, Osco Industries, Portsmouth, OH

Mitigating supply chain risk is a main concern of manufacturers, and for many, that could mean reshoring product to a domestic casting source. Tom Kayser will present what factors go into calculating the costs associated with sourcing overseas versus somewhere closer to where final assembly occurs.

1:30 – 3 p.m.

Additive Manufacturing

Room: 21
Session Chair:

Kirk Rogers
M&P Gravity Works LLC, Poland, OH

Panel: Industry Utilization – What Has Changed in the Last 8 Years? (23-129)

Dave Rittmeyer, Matthews International Corp., Pittsburgh, PA; Brandon Lamoncha, Humtown Products, Columbiana, OH; Rich Lonardo, Youngstown Business Incubator, Youngstown, OH

Over the past eight years, the landscape of additive manufacturing has changed greatly in the foundry industry. Come join us for a few of the most drastic changes and how you can improve your operations by adopting the AM technology that fits your foundry best. Listen to a panel of experts who have been early adopters, educators, and inspirers in the industry and learn what they would do if they had the opportunity to do it all over again.

Panel: Lions, Tigers, and Bears – Where Does Direct AM Fit Into Foundry Industry vs. Sand Printing and Robotics and Automation? (23-131)

Mark Barfoot, EWI, Buffalo, NY; Mike Shaffer, Addman Engineering, Bonita Springs, FL; Jason Walker, The Ohio State University, Columbus, OH

Foundries have to make well-informed capital investment decisions that often include the value proposition of emerging technologies versus procurement of additional traditional equipment assets. Industry 4.0 tools such as robotics and automation, in addition to additive manufacturing for molds and hard tooling production, have collectively demonstrated the potential to increase manufacturing efficiencies and in some cases replace some traditional foundry operations. How do foundries become more informed on these emerging technologies so that they can create a long-term capital investment strategy? While additive manufacturing (AM) is well understood from a business case analysis regarding its utilization for core and mold manufacturing via binder jet AM, or production of hard tooling from plastic printers, industry knowledge on how direct metal printing, robotics, and automation are all poised to increase profits and address workforce issues may not have as much data sets for foundry owners to assess the value proposition. Robotic solutions such as robotic milling are cost-effective for short run tooling, and robotic-based directed energy deposition (DED) additive manufacturing has the capability to repair castings and potentially replace castings for low volume spares. This panel will facilitate discussion about the emerging technologies and their state of maturity and benefits while also eliciting audience participation regarding emerging versus traditional investments to ensure foundry managers are best informed for critical CAPEX investments.

11:30 a.m. – 1 p.m.

Special Event

IL Venetian - The Piccolo Room

Past Presidents' Luncheon

The annual gathering for all past AFS Presidents. *Must be a previous AFS President to attend.*

11:45 a.m. – 12:45 p.m.

Special Event

Room: Casting Source Theater

IJMC-FEF Student Research Competition

The IJMC-FEF Student Research Competition empowers undergraduate college students to showcase their metalcasting research projects at the 127th Metalcasting Congress. Winners will earn scholarships and be published in the *International Journal of Metalcasting*, a valuable step in students' careers!

12:45 – 1:15 p.m.

Casting Designers & Buyers

Room: Casting Source Theater
Session Chair:

Shannon Wetzel
American Foundry Society, Inc., Schaumburg, IL

Case Study from the 2022 Casting of the Year Winner: Waupaca Foundry (23-120)

Robert Guillaume, Clint Waninger, and Tim Thill, Waupaca Foundry Inc., Tell City, IN

When it comes to customer and industry benefits, the 2022 Casting of the Year checked nearly all the boxes: Reshored manufacturing to the U.S.? Check. Increased quality and durability? Yes. Improved consumer confidence? Yep. Streamlined production and labor resources? Done. Nick Kern and Tim Hill at Waupaca Foundry will tell their story about how they collaborated with customer Amerequip to bring the first cast iron 12-in. backhoe bucket to market.

Environmental, Health & Safety

Room: 23
Session Chair:

Brent Charlton
Metal Technologies Inc.,
Auburn, IN

Emission Reduction Potentials in High-Volume Applications (23-095)

Joseph Muniza, BS, ASK Chemicals LLC,
Dublin, OH

The presentation looks at options to change binder systems to achieve up to 30% reduction in BTX emission with little investment and additional options that require investment but can achieve over 95% binder emission reduction.

Emission Control System Design: Understanding the Basics (23-024)

Brian Bakowski, SLR Consulting, Pittsburgh, PA

The role of the emission control system is to capture and control the emissions generated by the various processes at the foundry. Often times, the design criteria for a new system is overlooked or not fully understood, leading to a system which does not perform as required. When an emission control system does not perform properly, it becomes problematic from both regulatory and health and safety perspectives. This presentation examines the steps needed to design an emission control system. Beginning with the sources of emissions, sizing hoods to provide an acceptable capture efficiency will be discussed. The sizing of ductwork and an acceptable carrying velocity will be analyzed. Control equipment will be discussed along with their unique design considerations. Finally, the basics of fan design will be discussed and examine the essential variables needed to properly size a fan.

Engineering & Smart Manufacturing

Room: 24
Session Chair:

Doug Starr
Saudi Mechanical
Industries, Strongsville, OH

Improving Manufacturing Applications of Machine Learning by Understanding Defect Classification and the Critical Error Threshold (23-087)

David Blondheim, Jr., Mercury Marine,
Fond du Lac, WI

Machine learning (ML) is unlocking patterns and insight into data to provide financial value and knowledge for organizations. Use of machine learning in manufacturing environments is increasing, yet sometimes these applications fail to produce meaningful results. A critical review of how defects are classified is needed to appropriately apply machine learning in a production foundry and other manufacturing processes. Four elements associated with defect classification are proposed: Binary Acceptance Specifications, Stochastic Formation of Defects, Secondary Process Variation, and Visual Defect Inspection. These four elements create data space overlap, which influences the bias associated with training supervised machine learning algorithms. If this influence is significant enough, the predicted error of the model exceeds a critical error threshold (CET). There is no financial motivation to implement the ML model in the manufacturing environment if its error is greater than the CET. The goal is to bring awareness to these four elements, define the critical error threshold, and offer guidance and future study recommendations on data collection and machine learning that will increase the success of ML within manufacturing.

Don't Leave Cyber Security to Your IT Manager: Combating Cyber Threats Facing Foundries (23-019)

Dr. Sudesh Kannan, Co-Power LLC,
Schaumburg, IL; Ernest Kubick and Jeffrey Jones, MetalTek International, Waukesha, WI; Jeffrey Jones

Why don't more foundries take steps to protect their most sensitive data assets? Foundries cite that the lack of trained security staff and inadequate budgets are top barriers. However, given the enormous costs associated with a data breach, failing to protect against today's dynamic threat environment could prove disastrous. Cybersecurity at foundries face ever mounting threats. The current approach of simply using firewalls and anti-virus scanners is proving less effective every day, so a more holistic approach is needed.

Presenters will outline a top-down approach to creating a security framework for a foundry which addresses both IT and organizational issues—helping it be cost-effective and implementable. We will also provide a review of the NIST Framework and the use of a Security Risk Assessment (SRA) for the small- and medium-size foundry.

Women in Metalcasting

Room: 20
Session Chair:

Lizeth Medina-Balliet
Neenah Foundry Co.,
Neenah, WI

Panel: Fostering a Culture of Innovation or Drive to Growth (23-125)

Emily Bosovich, Kohler Co., Kohler, WI; Garret Davis, American Colloid Co., Chesapeake, VA; Sarah Jordan, Skuld LLC, London, OH; Jay Morrison, Carpenter Brothers Inc., Mequon, WI

Innovation has always been a way for a company to differentiate its offerings from the competition by seeing and doing things differently. Innovation is essential, and responding to quickly changing market conditions requires fostering a culture of innovation. This panel will explore how companies can support a culture of growth by creating healthy and creative environments, leveraging technology and digital tools, and building diverse teams.

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1:45 – 2:15 p.m.

Casting Designers & Buyers

Using the AFS Casting Alloy Data Search for Casting Design (23-080)

Jiten Shah, Product Development & Analysis LLC, Naperville, IL

Room: Casting Source Theater
Session Chair:

Shannon Wetzel
American Foundry Society, Inc., Schaumburg, IL

The latest version 3.0 of the AFS casting alloy data search (CADS) tool will be demonstrated. CADS now includes newly populated data of allowable design for commonly used aluminum, iron, and steel alloys derived from best practice data provided by a group of foundries. A new mold material data search (MMDS) tool also will be demonstrated with shell and 3D-printed ceramic sand data. CADS is an ongoing, multiyear project managed by AFS, developed, and maintained by PDA LLC and funded by DLA/AMC.

2:20 – 2:45 p.m.

Sponsored Presentation

Are You Ready? What to Do When the Inspector Shows Up!



Room: Casting Source Theater

Regulatory agencies conduct inspections for a variety of reasons. A disgruntled employee can retaliate by filing a complaint; there may have been an accident; you are part of a targeted sector within your industry; or the inspector just wanted to get out of the office. Regardless of the reason, you get the unannounced knock on the door, and the question is, "Are you ready?" The second question is, "How do you know?"

This presentation addresses these two questions by describing what to do during an inspection and presenting a simple management system. Although the focus of the management system is environmental, health and safety, the approach can be applied to all aspects of quality and production.

3:15 – 4:45 p.m.

Additive Manufacturing

The Dimensional Stability of Machinable Mold Media Using 3D-Printed Sand as a Comparative (23-057)

Sean M. Derrick and Dr. Sam Ramrattan, Western Michigan University, Kalamazoo, MI

Room: 21
Session Chair:

Kirk Keithly
ExOne, Troy, MI

For Industry 4.0 to take root more easily within the foundry industry, rapid casting (RC) techniques should be integrated into automated production lines. Accomplishing this goal requires developing rapid-mold-making processes which do not utilize support materials or post-processing, thus allowing molds to move directly from a given rapid process to a foundry pouring deck automatically and without human interaction. One such RC material candidate being evaluated at Western Michigan University offers excellent surface finish, accelerated production times, and isotropic mold properties while not requiring support material. The following study, a follow-up from the initial proof of concept, details an initial evaluation of this material's dimensional stability compared to patternless 3D-printed sand molds.

“The flexibility and quality is one reason we keep coming back.”



Pictured Is:
Dave Gross, Core Room Supervisor

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Henry Winter
President, Northern Stainless



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Additive Manufacturing

Room: 21
Session Chair:
Kirk Keithly
ExOne, Troy, MI

3D Printed Smart Mold for Sand Casting: Monitoring Pre-Pour Binder Curing (23-082)

Eric MacDonald, University of Texas El Paso, El Paso, TX; Jerry Thiel and Nathaniel Bryant, University of Northern Iowa, Cedar Falls, IA

The benefits of additive manufacturing for fabricating complex sacrificial sand molds for geometrically complex metal castings are revolutionizing the foundry industry driven by a digital manufacturing paradigm. The design freedom of 3D printing allows for new mold designs not possible with traditional approaches. However, research on the curing time of printed molds, including aging, requires more exploration. This study describes the experimental evaluation of 3D printed specimens in which embedded sensors were fully encapsulated into sand blocks during an interruption of the binder jetting process. Subsequently, over a 28-day duration, humidity, volatile organic compound generation, temperature, and barometric pressure were captured. Mechanical testing of specimens subjected was conducted. The use of embedded sensors could provide guidelines for mold and core storage conditions inform the minimum (for full curing) and maximum duration (mold expiration).

Cast Iron

Room: 23
Session Chair:
Brad Steinkamp
Dura-Bar, Woodstock, IL
Logan Bader
Caterpillar Inc.,
Jackson, MO

Evolution of the Metallurgical Quality of Spheroidal Graphite Iron During the Thermal Cycle of the Melt: Furnace – Ladle – Heating/Pouring Unit (23-034)

Gorka Alonso, AZTERLAN, Basque Research and Technology Alliance, BRTA, Durango, Spain; Beñat Bravo, Azterlan, Basque Research and Technology Alliance (BRTA), Durango, Spain; Dr. Doru Stefanescu, The Ohio State University and University of Alabama, Dublin, OH; Ramon Suarez, Veigalan Estudio 2010, Durango, Spain

The final properties of a ductile iron and its nucleation potential are determined by the different processes undergone by the melt from the melting in furnaces until the mold filling. The goal of this industrial research was to investigate the evolution of the metallurgical quality for a spheroidal graphite iron during its thermal cycle: furnace – ladle – heating/pouring unit (HPU). Cooling curves were recorded, and metallographic analysis was conducted on thermal analysis cups not inoculated to evaluate the nodule count, the shape parameters of graphite, and their size distribution. A clear loss of metallurgical quality was found during the whole manufacturing process. Extreme conditions on the HPU produce an evident degeneration of graphite. Ti carbonitrides and sulfides were detected as the main nuclei through SEM study. A significant decrease in the number of oxides was observed with holding times. Vaporization and oxidation of Mg seem to be the origin.

The Influence of Gating on Dross, Gas Porosity, and Oxide Films in Gray and Ductile Iron (23-042)

Roy Stevenson, MAGMA Foundry Technologies, Schaumburg, IL

The general perception within the cast iron industry has been that gray and ductile irons do not oxidize to the same extent as other alloys, and therefore defects such as bio-films that have been extensively studied in other alloy systems (Al and Mg) are not particularly concerning for cast iron. Confusion also remains as far as what causes dross to form in cast iron. This presentation will review some of the work that has been done when it comes to studying the formation of dross, gas porosity and oxide films in gray and ductile iron and will focus specifically on two case studies where high scrap rates were being experienced due to defects that formed during mold filling. The influence of the gating system on the formation of these defects will be highlighted in each case.

Future Leaders of Metalcasting

Room: 20
Session Chair:

Tom Bye
Dotson Iron Castings,
Mankato, MN

Panel: Reducing Stress to Mitigate Employee Fatigue and Burnout (23-142)

Michael Lenahan, Badger Mining Corp., Berlin, WI; Angela Schmeisser, St. Marys Foundry Inc., St. Marys, OH; TJ Costello, Charlotte Pipe & Foundry Co., Charlotte, NC; Scott Lakey, Lodge Mfg. Co., South Pittsburg, TN

Preventing burnout yields enhanced communication, increases profitability, and improves retention. Join us as foundry leaders share their stories on how they have succeeded and relished the benefits of mitigating employee burnout. Make plans to attend this interactive panel to discuss how you and your team can benefit.

Sponsored by:



3:15 – 5 p.m.

Molding Methods & Materials

Room: 24
Session Chair:

Sairam Ravi
Atek Metal Technologies,
Cedar Falls, IA

Panel: Digital Measurement of Active Clay in Green Sands (23-101)

James Springstead, Western Michigan University, Kalamazoo, MI; Brian Rachwitz, E.J. East Jordan, MI; Michelle Ring, Norican Group, Carmel, IN

Accurate measurement of active clay can help a green sand foundry control and achieve optimal sand properties. Historically, active clay levels have been measured using the traditional methylene blue (MB) test. A new alternative active clay test has been developed and tested, using a spectrophotometric technique. The new method replaces operator-dependent readings with a quicker, simpler, digital measurement of active clay in green sands.

Previously, the new testing was limited to laboratory mixed standard sands and not sands from the active foundry environment. In this presentation, the alternative test is used to measure more than 20 U.S. foundry sands with varying active clay levels in three independent laboratories. The study compares the results from the alternative measurement with the traditional MB test results. The research reveals that the alternative test method produces comparable active clay values to the traditional MB test, while offering less measurement variance, both between operators and between laboratories. Additionally, it's demonstrated that a lower sample size can be used to perform the alternate test, suggesting the potential for automation of this alternative test in the future.

Steel

Room: 22
Session Chair:

Dr. Robert Tuttle
Western Michigan University, Kalamazoo, MI

Panel: Automated Finishing in Steel Foundries (23-096)

Nic Tarzwell, Eagle Group Manufacturers, Muskegon, MI; Andrew Schelke, Sinto America, Grand Ledge, MI

Automated finishing has gained more importance in steel foundries but has traditionally been difficult to implement. Current technologies and implementation cases will be presented. The goal is to provide an opportunity to learn from others' experiences and make adoption easier.

Effect of Section Size on the Mechanical Properties of High Strength Low Alloy Steel (23-068)

Kingsley Amatanweze; Viraj Athavale; Soumava Chakraborty; Mario Buchely; Dr. Laura Bartlett; Ronald O'Malley; Daniel Field, Missouri University of Science & Technology, Rolla, MO; Krista Limmer, CCDC Army Research Laboratory, Aberdeen Proving Ground, MD; Katherine Sebeck, CCDC Ground Vehicle System Center, Warren, MI

Section size influences the cooling rate which has critical effect on the mechanical properties of steel castings. A study was conducted to investigate the effect of section size on the microstructure and mechanical properties of a quenched and tempered martensitic Cr-Ni-Mo steel poured into modified Y-block molds of varying section sizes. A commercially available computational fluid dynamics and solidification modeling software was used to determine the local solidification time and cooling rates of the castings in order to calculate the expected secondary dendrite arm spacing, SDAS, and this was compared with experimental results. Scanning electron microscopy and energy dispersive X-ray spectroscopy showed heavy segregation of Cr, Mo, and Mn in the last areas to solidify. Increasing the section size increased the SDAS, however, notch toughness tests carried out at -40 C showed little difference in average breaking energy, from 28 to 22 Joules.

Panel: Monitoring a Working Green Sand System Using Dynamic Testing and the Benefits of Using a Non-Standard Compactability Specimen (23-102)

Lee Wells and Sam Ramrattan, Western Michigan University, Kalamazoo, MI; Dave Paulsen, Furness Newburge Inc, Versailles, KY

The panel will present the results and findings from papers 23-061 and 23-062 that was AFS 4H sponsored research. Dynamic green sand tests such as modified cone jolt toughness (MCJT) and hot friability (HF) were able to differentiate among various green sand systems for the same compactability level (moisture content) and clay level. Furthermore, an AFS standard specimen is compared to a non-standard compactability test specimen.

Researchers monitored a working high production green sand system composed of a sodium and calcium Bentonite blend that is typical in cast iron foundries. The dynamic tests provide more relevant data about the green sand systems studied compared to AFS standard baseline tests. Furthermore, the non-standard compactability specimen showed less test-to-test variability when compared to an AFS standard specimen. The results obtained in this study are encouraging, and indicate that fast, inline, and accurate moisture measurement in green sand presents an opportunity to improve production control.

3:30 – 4:45 p.m.

AFS Institute Course

The 10-Step Method for Corrective Action – Part Two (23-118)

Patrick Kluesner, Grede Castings, Southfield, MI

Room: 19

Participants will be introduced to a basic overview of a casting defect analysis procedure. Course topics will include an introduction to the 10-step method for casting defect identification, how to compose a problem statement, a discussion on the importance of recording process parameters, an introduction to navigating the “International Atlas of Casting Defects,” and a path to identifying the correct defect and its root cause for corrective action. Learning a systematic procedure for root cause identification supports the business goal of designing, producing, and selling quality castings in a timely manner in a safe environment at a profit.

4:30 – 6 p.m.

Special Event

Exhibit Floor Reception

Hall C

Attendees are encouraged to mingle on the exhibit floor with exhibitors. Enjoy appetizers and refreshments.

6 – 7 p.m.

Special Event

Future Leaders of Metalcasting Reception

Room: 16

Join members of the AFS Future Leaders of Metalcasting and other industry professionals for a fun networking event for rising leaders. Bring your business card to enter the prize raffles. No prior registration necessary. All attendees are welcome to come on Wednesday April 26th in Room 16. For more information, contact Future Leaders of Metalcasting's liaison Cathy Potts at cpotts@afsinc.org.

Sponsored by:



6 – 9 p.m.

Special Event

AFS Alumni Dinner

(AFS Alumni only. Ticket required - \$125)

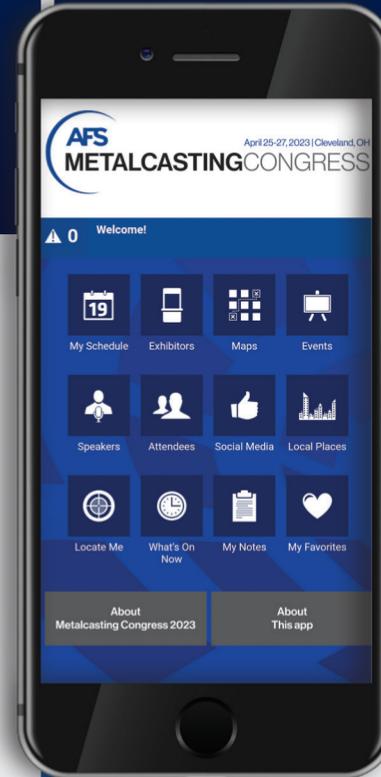
Rock & Roll Hall of Fame

Alumni will experience the Rock & Roll Hall of Fame, touring the special exhibits and permanent installations, while enjoying views of Lake Erie, FirstEnergy Stadium, and the Steamship William G. Mather. Buses depart the convention center at approximately 5:45 p.m. from the Lakeside Entrance. Return shuttles began at 8:15 p.m. *Must be AFS Alumni to attend.*

AFS METALCASTING CONGRESS

April 25-27, 2023 | Cleveland, OH

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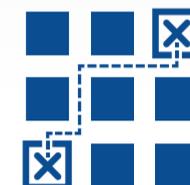
Events

A searchable directory of available sessions.



Speakers

A complete listing of all speakers at the event.



Floorplan

A viewable map to navigate the show floor with ease.



Exhibitors

A searchable list of all exhibiting companies.

Thursday, April 27, 2023

7 a.m.

Room: 16

Author Chair Breakfast

This breakfast is for AFS speakers, session chairs, students and staff to meet and coordinate details for the day's educational sessions.

8–9 a.m.

Cast Iron

Room: 23

Session Chair:

Julia Scruton
Baker Manufacturing Co.,
Evansville, WI

Ductile Iron Energy Use and Greenhouse Gas Emissions: Excel-Based Parametric Model Development and Application (23-014)

Yongxian Zhu, Gregory Keoleian, and Daniel Cooper, University of Michigan, Ann Arbor, MI

This study generates an Excel-based parametric cradle-to-gate Life Cycle Assessment (LCA) tool for ductile iron casting to help industry reduce their environmental impacts and to help product designers to make informed material selection decisions. The model is developed based on input from the literature, physics-based extrapolations, and recent material and energy data from 11 U.S. foundries representing 26% of the U.S. industry. We calculate a mean primary energy consumption of 37 MJ/kgproduct (range: 24-50 MJ/kgproduct) and greenhouse gas emissions of 2.2 kg.CO2eq./kgproduct (range: 1.6-3.0 kg.CO2eq./kgproduct). In Part 1 of this study, we present the approach for developing the Excel-based parametric LCA model and how to use the model. In Part 2, we conduct a comparative cradle-to-grave LCA of ductile iron versus other materials for automotive applications. Case study analyses reveal that ductile iron parts with material utilizations above 50% likely have lower life cycle impacts than steel or aluminum equivalents.

Lost Foam

Room: 21

Session Chair:

Tedd Sheets
Betz Industries,
Grand Rapids, MI

Improving Metal Flow in Lost Foam Casting Through Use of Low Thermal Degradation Hot Melt Adhesives (23-037)

Kyle Bieniewicz, Matt Reich, Nick Soraruf, Ashlyn Steer, and Paul Sanders, Michigan Technological University, Houghton, MI; Jacob Belke, Mercury Marine, Oshkosh, WI

Lost foam casting minimizes pattern design limitations by using pattern segments and hot melt adhesives to create complex geometries. Defects in cast parts have been shown to be caused by the higher thermal degradation energy densities in hot melt adhesives as compared to polystyrene. A polystyrene-based glue was designed to achieve a lower thermal degradation energy, measured via thermal gravimetric analysis (TGA), while maintaining qualitative metrics such as low odor and proper viscosity to avoid stringing during application. Casting trials were performed for multiple developed glue mixtures to assess the melt front velocities at each glue joint. The resulting polystyrene-based glue increased the melt front velocity by 75% at the glue joint compared to a commercial glue. The addition of a wax component increased the melt front velocity further and eliminated stringing upon application.

Lost Foam

Room: 21

Session Chair:

Tedd Sheets
Betz Industries,
Grand Rapids, MI

Surface Metrology of Resin Bonded Sand and Lost Foam Castings (23-028)

Sarah Jordan, Skuld LLC, London, OH; Christopher Brown, Worcester Polytechnic Institute, Worcester, MA; Katarzyna Peta, Poznan University of Technology, Poznan, Poland

Average roughness (Ra or Sa) is a frequently specified topographic characterization parameter for cast components. However, the limitations and implications of topographic measurements and roughness calculations are not generally well understood by casual users of these data. This presentation will cover recent advancements in surface metrology and a recent study of resin bonded sand and lost foam ductile iron castings. Topographic profile (height on a line $z=z(x)$) and areal (heights over a region $z=z(x,y)$) measurements were made on cast surfaces with a contact stylus profiler, and a Sensofar S neoX (in confocal and focus variation modes), and Gelsight (membrane and gel reflectance mapping). Measurements of contact angle wetting were also made to investigate the impact of the surface topography on a resulting topographically related property of the surface.

Metalcasting Research

Room: 24

Session Chair:

Adam Loukus
Loukus Technologies Inc.,
Calumet, MI

Advances in the Production of In-Situ Nanocomposite Castings (23-097)

David Weiss, Vision Materials, Manitowoc, WI

This presentation details the work done over the last 12 months on the nanocomposite development program, focusing on in-situ production in matrix alloys including the Al-Si-Ce, Al-Ce, Al-Cu and Al-Cu-Zn systems. Unique pathways for the production of nanocomposites are discussed which are significantly less expensive, and therefore more commercially viable, than ex-situ methods.

Role of Impurities on the Mechanical Behavior and Phase Stability in Al-Ce-Ni Hypoeutectic Systems (23-110)

Carl Soderhjelm, Diran Apelian, and Benjamin MacDonald, ACRC, Irvine, CA; David Weiss, Vision Materials, Manitowoc, WI

Increased efforts in electrifying the transportation sector have led to a renewed focus on light weighting through the implementation of Al alloys for structural components. This implementation requires the development of novel F-state Al alloys and processes including large scale high pressure die casting. Recently, the Al-Ce and Al-Ni eutectic systems have been considered for the base of novel compositions for casting alloys given their enhanced thermal stability over Al-Si. In this work, hypoeutectic alloys within the Al-Ce-Ni ternary system are designed through predictive CALPHAD calculations and experimentally validated with casting trials. Comparisons between the CALPHAD prediction and experimental result are discussed for the compositional ranges investigated. The effects of impurity elements, Fe and Si, on the castability, eutectic morphology and stability of secondary phases are elucidated. The mechanical behavior is assessed by F-state tensile testing and related to the observed microstructural variations between alloy compositions.

8 – 10:15 a.m.

AFS Institute Course

Improving the Effectiveness of Visual Inspection (23-119)

Ted Schorn, Enkei America, Inc., Columbus, IN

Room: 19

Castings continue to be subject to visual inspection to identify appearance-related defects. This human inspection is not 100% effective – but how good is it? How do you help people appreciate the significance of inspection errors? Attendees to this presentation will participate in a hands-on demonstration of inspection effectiveness on physical parts and learn how to do such demonstrations on their own parts to understand and measure visual inspection effectiveness. Schorn will provide expert advice and counsel on how best to develop inspection routines leading to improved miss rates and false alarm rates.

9 a.m. – Noon

Hall C

Exhibits Open

9 a.m.

Special Event

Exhibit Floor Breakfast

Hall C

Attendees are encouraged to visit exhibitors while grabbing a cup of coffee and breakfast.

9:15 – 10:15 a.m.

Additive Manufacturing

Additive Manufacturing Division Updates (23-143)

Kirk Rogers, M&P Gravity Works LLC, Poland, OH

Room: 21

Session Chair:

Kirk Rogers
M&P Gravity Works LLC,
Poland, OH

This presentation is a summary of the AM division's activities aimed at getting those interested in the division up to speed. We will cover mission, committee structure of the division, as well as committee mission statements. This will be followed by a review of recently completed projects, current division projects and project ideas the division is currently exploring.

Aluminum & Light Metals

Panel: U.S. Academic Research Infrastructure Supporting the Metalcasting Industry (23-113)

Carl Soderhjelm, Advanced Casting Research Center (ACRC), Irvine, CA; Alan Luo, The Ohio State University, Columbus, OH

Room: 22

Session Chair:

David Weiss
Vision Materials,
Manitowoc, WI

In October 2022, the National Science and Technology Council published a report titled: National Strategy for Advanced Manufacturing. The report emphasizes that manufacturing is an engine of America's economic strength and national security. Quoting from the report: "It is, therefore, imperative for the United States to develop and implement strategies to regain American leadership through investments in advanced manufacturing." Two major public universities, University of California, Irvine (UCI) and The Ohio State University (OSU), have joined forces to provide the educational and research home for the metal casting industry. The Advanced Casting Research Center (ACRC), founded by Prof. Diran Apelian in 1984, has grown to be the largest industry-university consortia in North America, dedicated to collaborative research in metal processing and manufacturing. The consortium brings fundamental understanding to existing processes, develops new methods and alloys, and resource recovery, and reuse of metals (recycling).

Metalcasting Research

Room: 24

Session Chair:

Mark Osborne
Wabtec, Haslet, TX

Cast Metal-Ceramic Composite Lattice Structures for Lightweight, Energy Absorbing Applications (23-079)

Alan Druschitz and Manuel Umanzor, Virginia Tech, Blacksburg, VA

Lattice structures are lightweight and can dissipate energy by plastically deforming but are exceptionally difficult to produce. The incorporation of ceramic or hard metal tiles within a lattice structure can increase penetration resistance. In this study, 3D printed sand molds and gravity pouring were used to produce lattice castings with embedded tiles. Computer simulation was used to compare the deformation characteristics of various lattice unit cell designs; the octet truss was determined to have the best combination of performance and manufacturability. Cast lattice structures were produced in nonferrous alloys (356 aluminum alloy, A206 aluminum alloy with 1% TiC nanoparticles) and ferrous alloys (high hardness alloy steel and non-heat treatable, low density, Fe30Mn4Al alloy). Low cost, high hardness, white cast iron or lightweight, high hardness, ceramic tiles were incorporated within the cast lattice structures. Casting simulation and casting trials were used to determine the practical limits of the casting process.

Meta-modeling Driven Intelligent Manufacturing of Ductile Iron Sand Castings With Near Real Time Corrective Actions to Eliminate Scrap (23-081)

Jiten Shah, Product Development & Analysis LLC, Naperville, IL

Meta models developed using historical processing data, DOE-based control experiment data and process modeling simulation outputs for predicting yield strength and shrinkage probability will be presented with case studies and production trials validating the predictions. The models consider various uncertainties and quantify for better correlation of the actual Vs predicted results. The presentation will summarize the outcomes of the AFS managed, PDA LLC led and DLA/AMC funded multiyear research project.

9:15 – 9:45 a.m.

Casting Designers & Buyers

Tensile Bar Castings (23-074)

Mark White, Impro Industries, Palm City, CA

Room: Casting

Source Theater

Session Chair:

Shannon Wetzel
American Foundry Society,
Inc., Schaumburg, IL

In new casting development projects, there exists some form of an agreement between the casting purchaser and the casting manufacturer outlining the technical requirements for qualification to production. These may range from comprehensive, specific dimensional and metallurgical requirements a to a lone AS9102 dimensional requirement. A gap exists where casting designer/purchaser may assume metallurgical requirements, such as that machined from casting (MFC) test bars are intended to and must meet ASTM requirements. This adds cost in terms of excessive mechanical testing and lost production. This presentation will go over the metallurgical differences of cast shapes through case studies, mechanical and process data, metallurgical summary, photos, and a practical guide to manage this topic.

9:30 – 11:30 a.m.

Hall C - AFS HUB - 423

Foundry-in-a-Box Demonstrations

Stop by and get “hands-on” by making your own casting. See how AFS conducts outreach with its customized Foundry-in-a-Box kit.

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10:30 a.m. – Noon

Room: 26ABC

Great Debate: Additive Manufacturing v. Castings v. Forgings (23-126)

Moderator:

Vasko Popovski
Ransom & Randolph

Additive Manufacturing:

John Wilczynski
America Makes- National Additive Manufacturing Innovation Institution

Richard Huff
ASTM International

Castings:

Randy Oehrlein
Carley Foundry Inc.

Charles Monroe
The University of Alabama

Forgings:

Bud Kinney
Retired from IMT Corporation

Pat Burke
Pursuit Aerospace



Designers have long debated the merits of various metal processing methods for use as metallic parts or in assemblies. Traditionally, castings and forgings were considered as preferred options. However, more recently, additive manufacturing of metallic objects has been similarly considered.

During this interactive, lighthearted, roast-style debate, experts in additive manufacturing, casting will argue the merits of their preferred methods – along with the demerits of the others – in an attempt to determine the “best” of the best.

This event should prove informative and entertaining, while perhaps establishing the definitive argument for the metallic part assembly community! After the longstanding argument on “Aluminum vs. Iron” was at least momentarily suspended following last year’s CastExpo debate in Columbus, OH, you will not want to miss this sequel to determine the best process for making metallurgical components in any alloy..

Noon

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Supplier Exhibitor Booth List - Alphabetical

As of 2/28/23

0-9

3D Systems* Booth 546

A

ABP Induction LLC* Booth 629
 Acme Manufacturing Booth 817
 Advanced Foundry Specialists LLC Booth 931
 Advanced Tooling Inc. Booth 649
AFS Institute* Booth 423
 Ajax TOCCO Magnethermic Corp.* Booth 404
 Albarrie Environmental Services Ltd.* Booth 613
 Allied Mineral Products Inc. Booth 311
 American Colloid Co.* Booth 712
 American Foundry Society (AFS)* Booth 423
 American Metalcasting Consortium Booth 746
 American Safety Clothing Inc. Booth 331
 AMETEK Land Booth 812
ASK Chemicals* Booth 325
 ATD Engineering & Machine* Booth 511

B

B&L Information Systems Inc.* Booth 405
 Badger Mining Corp.* Booth 823
 Blasch Precision Ceramics Inc. Booth 212
Blast Cleaning Technologies* Booth 935
 Bondtech Corporation* Booth 743
 Brokk Inc.* Booth 242
 Bruker AXS Inc. Booth 413

C

CADDIS Systems* Booth 337
 Capital Refractories Inc.* Booth 904
 CAPTURE 3D LLC Booth 727
 CARBO* Booth 418
 Carrier Vibrating Equipment Inc.* Booth 819
 Champion Chisel Works Booth 217
 Charles A Hones Inc. Booth 939
 Chesapeake Specialty Products Inc.* Booth 224
 Chiz Bros: Refractory and Insulation Specialists Booth 343
 Clansman Dynamics USA* Booth 612
 CMH Manufacturing Co. Booth 346
 CMI Novacast Inc.* Booth 339
 Conveyor Dynamics Corp.* Booth 510
 Covia* Booth 705
 Customized Energy Solutions* Booth 348

D

Del Sol Industrial Services Inc. Booth 713
 DIAMANT Polymers Inc. Booth 718
 DIAMTS* Booth 11501
 Didion International Inc.* Booth 510
 Ductile Iron Society Booth 717
 Dynamo Furnaces* Booth 646

E

Eccomelt Booth 230
 EKK Inc. Booth 813
 Electric Controls & Systems Inc.* Booth 747
 Elektrim Motors Booth 446
 Elkem Silicon Products* Booth 505
 Empire Systems Inc. Booth 235
 EMSCO Inc.* Booth 210
 Equipment Manufacturers Intl. Inc.* Booth 411
 Ervin Industries Inc Booth 319
 ETA Engineering Inc.* Booth 719
 Everett Industries LLC* Booth 825
 Exact Metrology Booth 815
 ExOne* Booth 805
 EZ Grout Corp.* Booth 222
 EZG Manufacturing* Booth 222

F

Factur Booth 336
 FEF Booth 625
 Ferroglobe Booth 943
 Finite Solutions Inc.* Booth 323
 FISA North America Inc.* Booth 927
 Flexovit USA Inc.* Booth 617
 Flow Science Inc.* Booth 315
 Foseco* Booth 229
 Foundry Lab Booth 905
 Foundry Solutions Metallurgical Services Inc.* Booth 619

G

General Kinematics Corp.* Booth 623
 GIFA & NEWCAST 2023 / Messe Duesseldorf North America Booth 312
 GILARDONI SpA Booth 827
 Godfrey & Wing Inc. Booth 818
 Goff Inc. Booth 313
 Gradmatic Equipment Inc. Booth 215
 Green Diamond Performance Materials* Booth 714
 GreenSand Controls Inc.* Booth 941
 Griffin Tool Inc. Booth 716
 Guardian Bandsaw* Booth 736

H

HA International, LLC*	Booth 631
HeatTek Inc.	Booth 223
Helluva Container Inc.*	Booth 948
Henschel Andromat Inc.*	Booth 811
Herschel Products Co. Inc.	Booth 412
High Temperature Systems Inc.*	Booth 322
The Hill & Griffith Co.*	Booth 417
Hirado Kinzoku Kogyo Co. Ltd.	Booth 929
Hitachi High-Tech America Inc.	Booth 214
Hoosier Pattern Inc.*	Booth 616
HOT Ideas LLC*	Booth 925
Humtown Products*	Booth 504
Hunter Foundry Machinery Corp.*	Booth 225

I

I2r Power*	Booth 922
Induction Technology Corp.*	Booth 841
Inductotherm Corp.*	Booth 611
InterTest Inc.*	Booth 937
ITOCHU Ceratech Corp.	Booth 723

J

JB DeVenne Inc.	Booth 951
Jesse Garant Metrology Center	Booth 843
Jinan Shengquan Group	
Share-holding Co. Ltd.	Booth 834
JOEST Inc.*	Booth 804
Joy Mark Inc.*	Booth 822

K

King Tester Corp.*	Booth 814
Kodiak Group*	Booth 734
KUNKEL-WAGNER Germany GmbH	Booth 241
Kuttner North America*	Booth 810

L

LAEMPE REICH*	Booth 605
Laser Abilities	Booth 226
Leading Marks LLC*	Booth 715
LECO Corporation*	Booth 335
LightSpeed Concepts Inc.*	Booth 334
Lincoln Electric Automation Inc.*	Booth 748
LPM North America Inc.*	Booth 829

M

Magaldi Technologies LLC*	Booth 735
MAGMA Foundry Technologies Inc.*	Booth 516
Matrix Sensors LLC	Booth 234
MB Superabrasives	Booth 216
Michigan Pneumatic Tool Inc.*	Booth 704
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Miracle Steel-KOTAR*	Booth 737
Modern Equipment Co. LLC*	Booth 840
Molten Metal Equipment Innovations	Booth 725
Mono Ceramics Inc.	Booth 349

N

Nederman MikroPul*	Booth 742
Non-Ferrous Founders Society	Booth 936
Norican Group*	Booth 826
NovaCast Solutions USA Inc.*	Booth 615
Novis Works LLC*	Booth 228
NT Ruddock	Booth 830
Nugent Sand Co. Inc.*	Booth 940
Nutec Bickley	Booth 816

O

Ohio Tool Systems	Booth 647
OmniSource Corp.	Booth 512
Online Resources Inc.*	Booth 835
Otto Junker (Junker Inc.)*	Booth 447

P

Pacific Consolidated Industries	Booth 240
Padnos	Booth 341
Palmer Mfg. & Supply Inc.*	Booth 218
Pillar Induction*	Booth 404
ProFound Alloys LLC	Booth 739
PureFlo	Booth 331
PushCorp Inc.	Booth 924
Pyrotek Inc.	Booth 239

Q

Quad City Safety Inc.*	Booth 331
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R

Red Sky Lighting LLC*	Booth 448
REFCOTEC Inc.*	Booth 604
Refractory & Insulation Supply Inc.*	Booth 915
Reliability Concepts*	Booth 329
Rotavi Industrial	Booth 842
ROYER	Booth 740

S

Saint-Gobain*	Booth 914
Saveway USA Corp.	Booth 310
The Schaefer Group Inc.*	Booth 942
SELEE Corporation*	Booth 847
Sintex Minerals & Services Inc.*	Booth 328
Sinto America*	Booth 517
SIR Robotics Inc.*	Booth 831
Southeastern Foundry Products & Foundry Coatings Inc.*	Booth 912
Spectro Alloys Inc.	Booth 547
SPECTRO Analytical Instruments*	Booth 846
Summit Foundry Systems Inc.*	Booth 911
Superior Graphite Co.*	Booth 416
Synchro ERP Ltd.*	Booth 314
SYSCON Sensors*	Booth 916

T

TEMC Metal & Chemical Corp.*	Booth 219
Thermo Fisher Scientific Elemental	Booth 918
Thermo Fisher Scientific Niton	Booth 548
Thermotec Industries*	Booth 913
Thermtronix Corp.	Booth 338
THORS eLearning Solutions	Booth 237
Tinker Omega Sinto*	Booth 513
Top Cat Air Tools	Booth 729
Tradesmen International*	Booth 347
Transmet Corp.	Booth 828

U

U-Metco Inc.	Booth 414
Universal Welding & Engineering Inc.*	Booth 749
USMFG Inc.	Booth 549

V

VCxray by Visiconsult	Booth 946
Verichek Technical Services Inc.*	Booth 449
Versevo Inc.*	Booth 648
VIBROTECH Engineering SL	Booth 917
ViewTech Borescopes	Booth 836
Viking Blast & Wash Systems*	Booth 839
Viking Technologies*	Booth 340
Visio Nerf Inc.*	Booth 928
VJ Technologies Inc.*	Booth 824
Voxeljet America Inc.*	Booth 213

W

Webb-Stiles Company	Booth 318
Weiler Abrasives	Booth 919
Whiting Equipment Canada Inc.	Booth 738
WINOA USA	Booth 731

Y

Youngstown State University- Excellence Training Center	Booth 247
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Z

Z3D Robotic Solutions	Booth 923
ZERUST Corrosion & Cleaning Solutions	Booth 710
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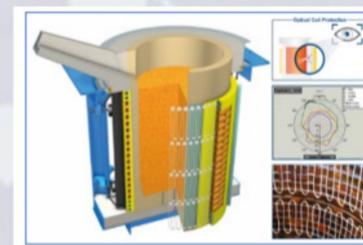
CHANNEL INDUCTOR POURING FURNACE



PUMA LADLE POURING SYSTEM



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As of 2/28/23

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Capital Refractories Inc. *	Booth 904
CMI Novacast Inc. *	Booth 339
Eccomet	Booth 230
Ferroglobe	Booth 943
Jinan Shengquan Group	
Share-holding Co. Ltd.	Booth 834
NT Ruddock	Booth 830
OmniSource Corp.	Booth 512
Padnos	Booth 341
Pyrotek Inc.	Booth 239
Spectro Alloys Inc.	Booth 547
VJ Technologies Inc. *	Booth 824

Alloys/Materials - Copper-Base

Capital Refractories Inc. *	Booth 904
NT Ruddock	Booth 830
OmniSource Corp.	Booth 512
Non-Ferrous Founders Society	Booth 936
Padnos	Booth 341
Zhejiang Changzheng Projector	
Carbon Electrodes Co. Ltd.	Booth 243

Alloys/Materials - Iron

Capital Refractories Inc. *	Booth 904
Ductile Iron Society	Booth 717
Elkem Silicon Products *	Booth 505
Ferroglobe	Booth 943
HA International, LLC*	Booth 631
Jinan Shengquan Group	
Share-holding Co. Ltd.	Booth 834
Neenah Foundry Co. *	Booth 542
Non-Ferrous Founders Society	Booth 936
OmniSource Corp.	Booth 512
Rotavi Industrial	Booth 842
Superior Graphite Co. *	Booth 416
Thermo Fisher Scientific Niton	Booth 548

Alloys/Materials - Magnesium

Ferroglobe	Booth 943
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Spectro Alloys Inc.	Booth 547

Alloys/Materials – Steel

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Share-holding Co. Ltd.	Booth 834
OmniSource Corp.	Booth 512
Padnos	Booth 341
Superior Graphite Co. *	Booth 416
Thermo Fisher Scientific Niton	Booth 548
U-Metco Inc.	Booth 414
USMFG Inc.	Booth 549

Alloys/Materials – Superalloys

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Alloys/Materials - Zinc

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OmniSource Corp.	Booth 512
Spectro Alloys Inc.	Booth 547

Engineering/Capital Equipment - Casting Design

Exact Metrology	Booth 815
Laser Abilities	Booth 226
MAGMA Foundry Technologies Inc. *	Booth 516
Online Resources Inc. *	Booth 835
ViewTech Borescopes	Booth 836

Engineering/Capital Equipment - Cleaning, Finishing & Shipping

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Conveyor Dynamics Corp. *	Booth 510
Didion International Inc. *	Booth 510
Everett Industries LLC *	Booth 825
Flexovit USA Inc. *	Booth 617
Foundry Solutions	
Metallurgical Services Inc. *	Booth 619
Goff Inc.	Booth 313
Hirado Kinzoku Kogyo Co. Ltd.	Booth 929
Leading Marks LLC *	Booth 715
Lincoln Electric Automation Inc. *	Booth 748
MB Superabrasives	Booth 216
Michigan Pneumatic Tool Inc. *	Booth 704
Norican Group *	Booth 826
SIR Robotics Inc. *	Booth 831
Top Cat Air Tools	Booth 729
Viking Blast & Wash Systems *	Booth 839
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Z3D Robotic Solutions	Booth 923
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Engineering/Capital Equipment – Engineering

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Chiz Bros: Refractory and	
Insulation Specialists	Booth 343
Conveyor Dynamics Corp. *	Booth 510
Del Sol Industrial Services Inc.	Booth 713
Electric Controls & Systems Inc. *	Booth 747
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MAGMA Foundry Technologies Inc. *	Booth 516
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Palmer Mfg & Supply Inc. *	Booth 218
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SIR Robotics Inc. *	Booth 831
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Viking Blast & Wash Systems *	Booth 839
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ETA Engineering Inc. *	Booth 719
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Saveway USA Corp.	Booth 310

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AMETEK Land	Booth 812
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B&L Information Systems Inc. *	Booth 405
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EKK Inc.	Booth 813
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Sand Mold/Core Making - Sand Molding Equipment

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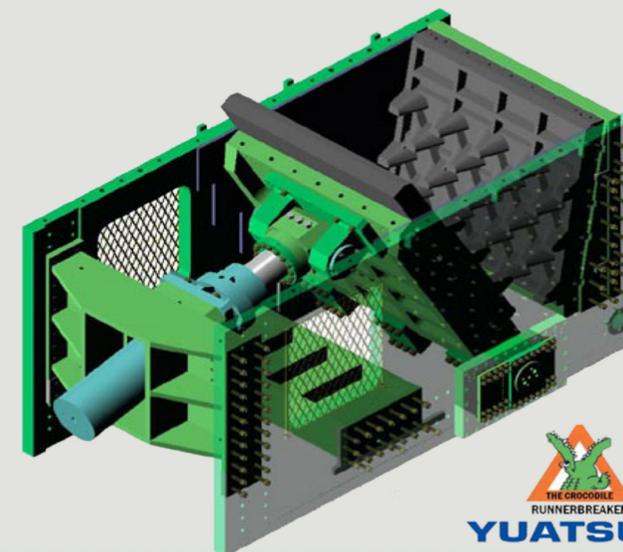
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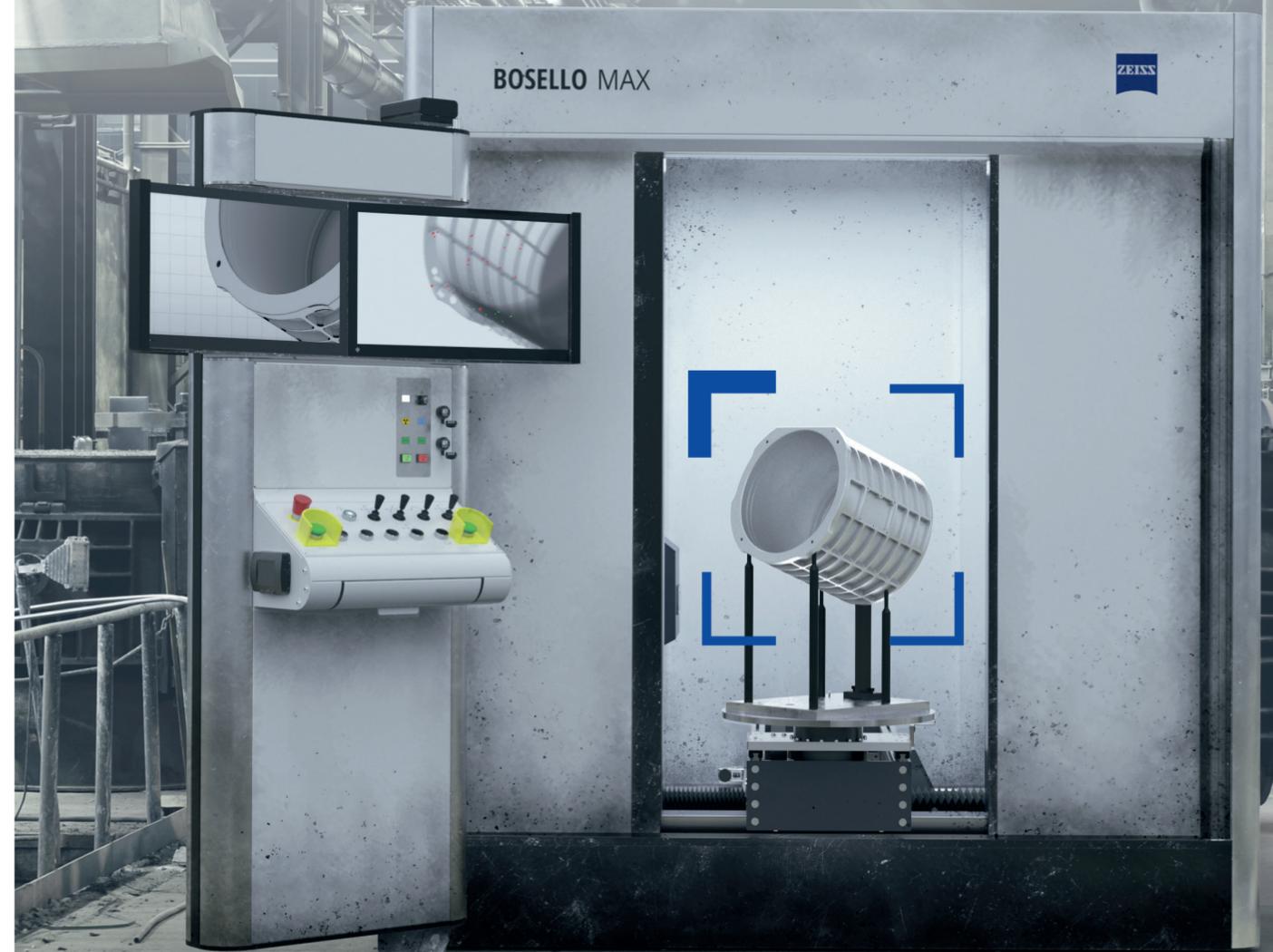
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www.magaldi.com
(678) 705-9219

Incorporated in 2015, Magaldi Technologies LLC is the fast-growing sales, service and local engineering arm of the Magaldi Group for the US and Canada. In North America, there are over 100 Magaldi systems in operation. These systems are improving the operations at foundries, steel mills, aluminum recycling plants, coal and biomass-fired power plants and many others. Based on the Superbelt® technology, Magaldi has developed a wide range of technological solutions to meet the most demanding requirements of foundries (ferrous and non-ferrous).

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(847) 299-0950

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Booth 240

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www.thermotecindustries.com
(440) 277-1246

Thermotec's primary goal is to produce world-class consumable products for the foundry and steel industry using the highest quality raw materials. Our stringent ISO-Certified quality control program has allowed us to establish partnerships with some of the largest foundries and steel plants in the world. Thermotec manufactures products with rigorous dimensional and raw material controls, assuring our customers a consistent, value added, cost-effective product.

Thermtronix Corp. **Booth 338**
17129 Muskrat Ave.
Adelanto, CA 92301
www.thermtronix.com
(760) 246-4500

Thermtronix is a specialized technology company with a single focus on aluminum melting. While Thermtronix offers a full line of both gas and electric melting and holding furnaces ranging in sizes from 250 lbs. through 3,000 lbs., as well as ancillary systems, our principal products are crucible style aluminum and magnesium melting along with holding furnaces for the foundry and die casting industries. Over twenty-five hundred Thermtronix furnaces are presently operating throughout North America as well as other countries.

THORS eLearning Solutions **Booth 237**
5054 Paramount Blvd.
Medina, OH 44254

Tinker Omega Sinto* **Booth 513**
PO Box 328
Springfield, OH 45501-0328
www.tinkeromega.com
(937) 322-2272

Tinker Omega Sinto LLC is part of the largest foundry equipment company in the world. We specialize in Equipment and Systems for No-Bake Sand Foundries. Our product lines include Sand Mixers, Sand Temperature Control, Mold Making, Core Making, Pouring & Cooling and all aspects of Sand Reclamation. We also have recently introduced our RSM Robot Sand Milling System that allows a foundry to make a mold directly from a 3D model.

Top Cat Air Tools **Booth 729**
38285 Pelton Rd.
Willoughby, OH 44094
www.tcservice.com
(440) 954-7500

The Top Cat brand of pneumatic power tools are made in Willoughby, OH, USA. We offer a wide range of material removal and surface conditioning tools for applications in heavy industries. We serve industries such as steel, iron and aluminum foundry finishing rooms. Our products include grinders, sanders, percussive tools and saws in many forms (vertical, horizontal, extended, right angle and die grinders). Our industrial tools help companies increase production rates and reduce operator strain by optimizing the material removal operation. Distributor inquiries are welcome.

Tradesmen International * **Booth 347**
9760 Shepard Rd.
Macedonia, OH 44056
www.tradesmeninternational.com
(844) 687-3480

An Experienced Pool of Proven, Contingent Manufacturing & Industrial Trades Tradesmen International® has been recruiting, onboarding, and retaining verifiably skilled manufacturing craftworkers since 1992. Each employee completes a stringent hiring process, including in-person or virtual interviews, skills evaluations, and more. The result is a formidable database of proven manufacturing and industrial trade workers who are available on a just-in-time basis.

Transmet Corp. **Booth 828**
4290 Perimeter Dr.
Columbus, OH 43228-1036
www.transmet.com
(614) 276-5522

U
U-Metco Inc. **Booth 414**
8651 E. 7 Mile Rd.
Detroit, MI 48234-3658
www.u-metco.com
(313) 366-1010

U-Metco Inc. is a supplier of high quality scrap steel and stainless steel Melting Stock and Cover Steel Punchings for ferrous foundries throughout North America. They offer a wide range of consistent, guaranteed chemistry steel and stainless steel alloys in the form of punchings, plate and bar. Materials are processed to be clean and dry, and packaged for maximum efficiency in handling in charging. Chemical certificates of analysis are also provided with each shipment.

Universal Welding & Engineering Inc. * **Booth 749**
1709 Pearl St.
Waukesha, WI 53186
www.universal-welding.com
(262) 544-6416

Universal Welding & Engineering is a full-service metal fabricator specializing in foundries, OEMs, and heavy industry.

We manufacture flasks, lining forms, transfer cars, ladle shells and bails, reverb furnace shells, rotary screens, shaker sections, and other fabrications for the molding, melt, maintenance, and engineering departments.

We have a reputation for fabricating durable, high quality equipment. We are responsive, reliable, and easy to work with.

Basically, if it's in a foundry and it's fabricated, we can build it.

We have a wealth of experience. What can we do for you?

USMFG Inc. **Booth 549**
1500 Kalamazoo St.
South Haven, MI 49090
www.us-mfg.com
(269) 637-6392

USMFG Inc. was formed to provide the highest quality briquettes materials to the foundry and steel industry in the US. It is a subsidiary of MFG mbH, Germany, which has decades of experience in this field. We are a US based supplier of metals and alloys including silicon-based materials, ferromanganese, silicon carbide and briquetted materials to the foundry and steel industry. Our sales and service personnel work closely with our customers to provide briquetted materials specific to their unique operation.

V
VCxray by Visiconsult **Booth 946**
Brandenbrooker Weg 2-4
Stockelsdorf 23617
Germany
www.visiconsult.de

VisiConsult is a family owned company located in Northern Germany and known as the leading supplier for customized and standard X-ray inspection systems. To ensure a premium quality, all products are developed and produced locally as turnkey solutions. This leads to cutting edge technology and an unmatched flexibility. Our goal is to solve inspection problems with tailored systems, while guaranteeing a premium post-sales service. More than 25 years of expertise in industrial (NDT) and security applications combined with experienced engineers result in solutions that set new industry standards.

Verichek Technical Services Inc. * **Booth 449**
3000 Industrial Blvd.
Bethel Park, PA 15102-2538
www.verichek.net
(412) 854-1800

Verichek Technical Services, Inc. provides the Metal Analysis Testing & Services that your operation requires such as metal testing, metal testing equipment, support, training, and maintenance & repair.

Versevo Inc. * **Booth 648**
1055 Cottonwood Ave
Hartland, WI 53029-8309
www.versevo.com
(262) 369-8210

VIBROTECH Engineering SL **Booth 917**
Txirrita Maleo 7C
Renteria, Guipuzcoa 20100
Spain
www.vibrotech-eng.com
+34 943 010 811

VIBROTECH ENGINEERING is a manufacturer of vibrating equipment for the foundry industry. Furnace chargers, resonance conveyors, shake outs, casting and sand coolers.

ViewTech Borescopes

Booth 836

1745 Barlow St.
Traverse City, MI 49686
www.ViewTech.com
(231) 943-1171

ViewTech's VJ-3 & VJ-4 articulating video borescopes are nondestructive visual testing instruments used for remote visual inspection of machinery, equipment, & components. Our borescopes facilitate the visual recording & photo documentation of areas that are otherwise inaccessible or require great effort and expense to access directly.

Visit booth 836 to arrange a no-cost, no-obligation demo to trial a ViewTech video borescope at your own facility.

VJ-3 Video Borescopes

- 2.2mm
- 2.8mm
- 3.9mm
- 6.0mm
- Dual Camera
- Far Focus

VJ-4 Video Borescopes

- 2.2mm
- 2.8mm
- 3.9mm
- 6.0mm
- Dual Camera
- Far Focus

Viking Blast & Wash Systems *

Booth 839

731 S. Industrial Ct.
Rose Hill, KS 67133
www.vikingcorporation.com
(316) 634-6699

Viking Blast & Wash Systems manufactures and distributes a full line of industrial cleaning machines including abrasive shot blast machines, parts washers and vibratory deburring equipment. Such equipment cleans and removes mill scale, dirt and rust, and is ideal for the preparation of large numbers or exceptionally complex parts. We also offer an extensive line of replacement parts, including replacement parts for our competitors' equipment. Additionally, we offer a wide range of premium quality abrasives and cleaning compounds.

Viking Technologies *

Booth 340

25169 Dequindre Rd.
Madison Heights, MI 48071
www.viking-technologies.com
(248) 548-3038

Supplier of the pourTECH Automatic Pouring System, featuring bottom pouring ladles and/or pouring furnace systems - for increased productivity, quality and operator

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Visio Nerf Inc. *

Booth 928

2791 Research Dr.
Rochester Hills, MI 48309
www.visionerf.com
(248) 564-2003

VJ Technologies Inc. *

Booth 824

89 Carlough Rd.
Bohemia, NY 11716-2903
www.vjt.com
(631) 589-8800

VJ Technologies Inc. (VJT) is a global leader in providing Digital Radiography and Computed Tomography x-ray inspection systems and solutions for a variety of industries. For over 35 years, VJT's engineers have developed ground breaking solutions. Through VJT's experience it has led to innovative decisions and more advanced capabilities than competitors in our standardized systems. Our imaging systems are used throughout the world for radiosopic inspection of products and assemblies to detect defects or foreign matter, reducing cost and time while increasing quality and safety.

Voxeljet America Inc. *

Booth 213

41430 Haggerty Cir. S.
Canton, MI 48188-2227
www.voxeljet.com
(734) 808-0025

W

Webb-Stiles Company

Booth 318

675 Liverpool Dr.
Valley City, OH 44280-0464
www.webb-stiles.com
(330) 225-7761

Since 1956, Webb-Stiles Company has provided custom, turn-key, material handling solutions for medium to heavy-duty logistical challenges. Solutions built with top-rated quality material and durability in mind, our conveyors, have become highly regarded in the Automotive, Tire & Rubber, Appliance, Defense, Foundry & Casting, and Finishing Industries, among many others. We provide custom-engineered solutions to meet the individual application needs of our customers. We do not rely on prefabricated solutions to solve unique applications. We are family owned and operated.

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Take it from some great metalcasters like Waupaca, Charlotte Pipe & Foundry Inc., and Benton Foundry Inc.



"Every employee can log in and go through the modules at their own pace. It helps new employees familiarize themselves with the processes. They can take the information they've learned and utilize it in their daily job."

Jane Fischer
Manager of Training & Development, Waupaca Foundry



"For various processes, our folks are able to understand and use these terms for creating more effective conversations and discussions both out on the work floor and in planning groups."

Glenn Huneycutt
Safety & Health Manager, Charlotte Pipe & Foundry



"The AFS e-learning courses have afforded me the opportunity to take deeper dives into areas I wanted to improve my knowledge on, whether it's quality, engineering, manufacturing."

John Harvey
Direct Sales, Benton Foundry

Foundry E-Learning is ideal for **training new hires...**not to mention for **cross-training and developing promising employees.** Customize your own training program with 110 modules covering all aspects of the foundry.

Contact **Jen Christian** at jchristian@afsinc.org or **847-824-0181** to schedule a free, no-obligation live demonstration.

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You need Foundry E-Learning

The **AFS Institute** offers **more than 100 on-demand Foundry E-Learning modules** ranging in length from 15 minutes to over an hour, viewable on any device or browser. **Foundry E-Learning modules** focus on practical job skills you can use immediately. Each module is based on adult education best practices and strives to engage you throughout. You can purchase Foundry E-Learning modules in two ways:

Foundry E-Learning Subscription Program

Access the full suite of Foundry E-Learning modules for all your employees at one location. The annual subscription fee is based on the number of employees in your facility:

**\$1,300 up to 100 employees | \$2,600 up to 250 employees
\$5,200 over 250 employees**

Foundry E-Learning Module Individual Access

Foundry E-Learning modules also are available for individual access for 30 days.

**Members - \$55 per module
Non-members - \$110 per module**

Contact **Jen Christian**, Director of Training Solutions, at jchristian@afsinc.org, to discuss your foundry's training needs or to schedule a free, no-obligation demonstration. To register, visit www.afsinc.org/elearning or fill out the form below.

Foundry E-Learning Categories Include:

- 3D Sand Printing
 - Coldbox
 - Lost Foam
 - Nobake Molding
 - Aluminum
 - Copper
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 - & Coremaking
 - Basics of Metalcasting *
 - Gating and Riser Design
 - Heat Treatment
 - Sand Testing
 - Casting Defect Analysis *
 - Green Sand Molding *
 - Metalcasting Safety
 - Steel
 - Cast Iron
 - Lean Manufacturing
 - Permanent Mold
- * Available in Spanish

Foundry E-Learning Subscription Application

Program Fees

- \$1,300 Corporate Members with up to 100 employees (per plant)
- \$2,600 Corporate Members with up to 250 employees (per plant)
- \$5,200 Corporate Members with more than 250 employees (per plant)

Program Requirements

- Corporate membership must be kept current during 12 month subscription period.
- Training administrator must be designated.
- No refunds or proration of funds once access is established for training administrator.
- A separate subscription and application form is required for each plant.

Optional and tax deductible:

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Form below is only for the **Foundry E-Learning Subscription Program**.
For **Foundry E-Learning Module Individual Access** please visit www.afsinc.org/e-learning.

Company Information:

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Address City/State/Zip

Designated Training Administrator/Contact Person

Phone Email

Number of Employees

Payment:

- American Express MasterCard VISA Check enclosed

Card Number CV# Expiration Date

Cardholder's Name

Authorized Signature Date

Return completed application with payment to:
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Tel: 847-824-0181/800-537-4237 | Fax: 847-824-7848 | www.afsinc.org

Weiler Abrasives

1 Weiler Dr.
Cresco, PA 18326-9804
www.weilerabrasives.com
(800) 835-9999

Booth 919

As an industry leader and global manufacturer of surface conditioning solutions, Weiler Abrasives is dedicated to forging collaborative relationships with our customers in diverse markets - Metal Fabrication; Industrial Production; and Maintenance, Repair & Operations - to tackle their toughest cleaning, grinding, cutting, deburring and finishing challenges. Our new foundry abrasives deliver maximum performance in the cleaning room. We offer the right product solutions and expertise to help you find production and process efficiencies and eliminate the bottleneck in your operations.

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350 Alexander St.
Welland, Ontario L3B 5P4
Canada
www.whiting.ca
(905) 732-7585

Booth 738

Whiting Equipment Canada is a wholly owned subsidiary of Whiting Corp., Monee, Ill. The company and its subsidiary manufacture meltshop and material handling equipment for ferrous and nonferrous industries, including electric arc furnaces, ladles, transfer cars, charge buckets, EAF control upgrades, tilting stands, AOD systems and overhead traveling cranes. The Whiting booth will be staffed with technical specialists ready to discuss the technical aspects of your future projects, along with Whiting's engineering and manufacturing capabilities.

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18900 Rialto St.
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Booth 731

Winoa USA is the largest Steel Abrasive Manufacture. We are an innovative and Eco-friendly solution provider that listens to the voice of the customer. By asking the right open-ended questions, Winoa USA strives to fulfill customers' expectations and demands. New products, services, and technologies with high-added value Winoa USA's technical expertise is amplified by its technological research and development. It is a constant quest that enables Winoa USA to bring new high-value-added products, services, or technologies to the market.

Y

Youngstown State

University-Excellence Training Center **Booth 247**
1 University Plaza
Youngstown, OH 44555
www.ysu.edu/excellence-training-center
(330) 941-2358

Z

Z3D Robotic Solutions

11 Southwood Ln.
East Granby, CT 06026
www.z3dsolutions.com
(860) 380-0198

Booth 923

Z3D Robotic Solutions specializes in the design of grinding equipment specialized for automated applications. In addition Z3D also offers turn-key robotic solutions for companies looking to take their first plunge into automated grinding. Z3D also offers "DIY" robotic cells which utilize grinding equipment from our standard catalog and is a great cost saving measure for those companies who already have engineering and programming talent in house.

No matter how far along on the path of automation your company is, Z3D has a Solution for you.

ZEISS Industrial Quality Solutions

Maple Grove, MN 55369-6310
www.zeiss.com/metrology
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Booth 236

ZEISS Industrial Quality Solutions is a leading manufacturer of multidimensional metrology solutions. These include coordinate measuring machines, optical and multisensor systems, microscopy systems for industrial quality assurance as well as metrology software for the automotive, aircraft, mechanical engineering, plastics and medical technology industries. Innovative technologies such as 3D X-ray metrology for quality inspection round off the portfolio.

ZERUST Corrosion & Cleaning Solutions

Booth 710

4201 Woodland Rd.
PO Box 69
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www.zerust.com
(763) 225-6600

ZERUST® offers a full line of corrosion inhibitor packaging, rust, corrosion, and cleaning solutions. ZERUST®; is the inventor of Volatile Corrosion Inhibitor (VCI) poly technology and offers expert on-site support in over 70 countries worldwide. For nearly 50 years, ZERUST® has helped customers reduce the cost and problems associated with corrosion. Have a challenging corrosion prevention need or a metal cleaning & degreasing solution? Trust ZERUST® to help you manage corrosion in your operations. For more information, visit www.zerust.com.

Zhejiang Changzheng Projector Carbon Electrodes Co. Ltd.

Booth 243

No. 99 Zhigang Rd.
Nanxun Town, Huzhou Zhejiang Province 313009
China
www.czcarbon.com
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The world's largest producer of gouging carbon electrodes The factory was founded in 1977, since then we have been constantly improving on gouging rods processes and technology. Right now we have over 200 sizes, including Pointed, Jointed, Flat and Hollow rods etc. With nearly 30 years experience, we are the experts of producing gouging rods and we also establish the Chinese Gouging Electrodes Standard, so you can trust our products. Our goal is to provide quality products to meet your requirements. The plant is located in NanXun Town, HuZhou City, ZheJiang Prov. about 100Km West of Shanghai S.

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Energy is a major cost for all manufacturers. That's why AFS partners with APPI Energy to provide data-driven, holistic energy management services to our Corporate Members.

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With unique products and services for foundries and the broader manufacturing industry, Cottingham & Butler is AFS's trusted resource for property and casualty insurance for our members. Their dedicated insurance, safety, and claims professionals specialize in lowering the total cost of risk and focus on bringing the best solutions to their clients. Cottingham & Butler is the 5th largest privately held broker in the U.S., the 25th largest insurance broker in the U.S., and a recognized leader in offering innovative property and casualty solutions. Learn more at AFSinc.org/property-casualty-insurance.



RETRANS FREIGHT

For metalcasters, shipping freight is nothing but an expense that subtracts from the bottom line. To help cut costs, AFS has joined forces with ReTrans Freight to offer our Shipping Solutions program to AFS Corporate Members.

How are these savings possible? Using the purchasing power of more than 2,500 manufacturers and distributors, ReTrans Freight has the buying power to keep your shipping rates minimal. Additionally, you can reduce clerical and accounts payable expenses through an automated, web-based process. Learn more at AFSinc.org/afs-shipping-solutions.



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It's never been more challenging to find qualified candidates to fill job openings – but the AFS Career Center can help! This job board attracts people who are looking for exactly the kinds of careers your company offers. AFS Corporate Members save on every post, helping your recruiters identify candidates with the right experience and skills from Day 1.

CINA Exhibitor Booth List – Alphabetical

As of 3/8/23

A

Aalberts Surface Technologies *	Booth 540
Alliant Castings *	Booth 643
Atlas Foundry Co. Inc. *	Booth 438

D

Denison Industries Inc. *	Booth 640
Dotson Iron Castings *	Booth 534

E

Elyria & Hodge Foundry Group *	Booth 637
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G

Great Lakes Castings LLC *	Booth 541
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I

Impro Industries USA Inc. *	Booth 535
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J

Jassos Steel Foundry	Booth 442
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K

Kimura Foundry America Inc. *	Booth 639
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L

LeClaire Manufacturing Co. *	Booth 434
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M

Monarch Industries Ltd.	Booth 641
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N

Neenah Foundry Co. *	Booth 542
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O

Osco Industries Inc. *	Booth 634
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P

Palmer Foundry Inc. *	Booth 443
Pier Foundry & Pattern Shop *	Booth 635
Product Development & Analysis (PDA) LLC *	Booth 441

R

Rochester Metal Products Corp. *	Booth 440
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S

St Marys Foundry Inc. *	Booth 436
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T

TB Wood's Inc. *	Booth 543
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W

Waupaca Foundry Inc. *	Booth 435
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CINA Exhibitor Booth List – Category

As of 3/8/23

Alloys/Materials – Aluminum

Aalberts Surface Technologies *	Booth 540
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Alloys/Materials - Iron

Atlas Foundry Co. Inc. *	Booth 438
Dotson Iron Castings *	Booth 534
Elyria & Hodge Foundry Group *	Booth 637
Great Lakes Castings LLC *	Booth 541
Neenah Foundry Co. *	Booth 542
Osco Industries Inc. *	Booth 634
Pier Foundry & Pattern Shop *	Booth 635
St Marys Foundry Inc. *	Booth 436
Waupaca Foundry Inc. *	Booth 435

Alloys/Materials – Steel

Aalberts Surface Technologies *	Booth 540
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Engineering/Capital Equipment - Casting Design

Product Development & Analysis (PDA) LLC *	Booth 441
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Engineering/Capital Equipment – Engineering

LeClaire Manufacturing Co. *	Booth 434
Product Development & Analysis (PDA) LLC *	Booth 441

Engineering/Capital Equipment - Patternmaking & Tooling

LeClaire Manufacturing Co. *	Booth 434
Pier Foundry & Pattern Shop *	Booth 635
Product Development & Analysis (PDA) LLC *	Booth 441

Engineering/Capital Equipment - Software

Product Development & Analysis (PDA) LLC *	Booth 441
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Engineering/Capital Equipment - Value-Added Services (Machining, Painting, Assembly, etc.)

LeClaire Manufacturing Co. * Booth 434

Melting/Melting Quality - Casting Quality & Testing

TB Wood's Inc. * Booth 543

Melting/Melting Quality - Ferrous Melting

Pier Foundry & Pattern Shop * Booth 635
TB Wood's Inc. * Booth 543

Molding Processes - Chemically-Bound Sand

TB Wood's Inc. * Booth 543

Molding Processes - Green Sand

Dotson Iron Castings * Booth 534
LeClaire Manufacturing Co. * Booth 434
Neenah Foundry Co. * Booth 542
Osco Industries Inc. * Booth 634
Pier Foundry & Pattern Shop * Booth 635
TB Wood's Inc. * Booth 543
Waupaca Foundry Inc. * Booth 435

Molding Processes - Permanent Mold

Denison Industries Inc. * Booth 640
LeClaire Manufacturing Co. * Booth 434

Sand Mold/Core Making - Coremaking

Denison Industries Inc. * Booth 640
Pier Foundry & Pattern Shop * Booth 635
TB Wood's Inc. * Booth 543

Sand Mold/Core Making - Rapid Prototyping

Denison Industries Inc. * Booth 640

Dotson Iron Castings *

Booth 534

200 W Rock St
Mankato, MN 56001-3473
www.dotson.com
(507) 345-5018

Dotson Iron Castings is a leading manufacturer of ductile iron castings to various markets, including agriculture, construction, heavy truck, railroad, oil gas, and industrial. Our capabilities include in-house tooling and machining, painting, heat treatment, and assembly. Dotson supplies the industry's shortest lead times, an award-winning engineering, and a dedicated account team. If you are tired of unstable suppliers and inconsistent quality, it's time to come experience the "Dotson Difference."

E

Elyria & Hodge Foundry Group *

Booth 637

120 Filbert St.
Elyria, OH 44035
www.elyriafoundry.com
(440) 322-4657

Producers of grey ductile iron castings from 50# to 200,000# in medium to low volumes participating in a wide variety of markets.

G

Great Lakes Castings LLC *

Booth 541

800 N Washington Ave
Ludington, MI 49431-2724
www.greatlakescastings.com
(231) 843-2501

Great Lakes Castings has been a producer of high-quality grey iron castings for 77 years now! We produce castings with weights ranging from 1lb to just over 50 lbs from low volume to high volume. We feature both horizontal match-plate molding and vertical DisaMatic molding. We have heat treatment internal to our facility to help provide iron that is very consistent when it comes to machineability. We cover a variety of industrial markets and support OEM's direct or Tier 1/Tier 2 supply chains. Please visit our website at www.greatlakescastings.com.

I

Impro Industries USA Inc. *

Booth 535

21660 E Copley Dr. Ste. 100
Diamond Bar, CA 91765-5492
www.improprecision.com
(909) 396-6525

J

Jassos Steel Foundry

Booth 442

Camino al Panalillo 150
Bosques de la Florida, San Luis Potosi 78420
Mexico
www.jsteelf.com
+52 1 444 205 6599

Casting: Carbon steels, Low and medium alloy steels, Stainless steels, Gray iron, nodular iron, and chrome iron, Manganese steels. Three induction furnaces with a capacity of 3 tons per hour Chemical molding carousel and manual molding. Capacity for parts ranging from 1 kg to 1.5 tons. Heat treatment furnaces Model workshop. Casting simulation software. Certified personnel in non-destructive testing. 32-channel spectrometer Nitrogen, oxygen, and hydrogen gas analyzer Carbon and sulfur analyzer. Mechanical material testing (tensile and impact) Certified personnel in non-destructive testing.

K

Kimura Foundry America Inc. *

Booth 639

789 W Boomer Way
Shelbyville, IN 46176
www.kimurafoundry.com
(317) 604-5158

L

LeClaire Manufacturing Co. *

Booth 434

3225 Zimmerman Dr.
Bettendorf, IA 52722-0023
www.leclairmfg.com
(563) 723-0544

LeClaire Manufacturing is a single-source sand and permanent mold aluminum casting company. We offer a streamlined, vertically integrated process that eliminates the middleman - and the markup - and lets you source your entire project through a single shop, LeClaire Manufacturing. From molds and patterns to leak testers and machining fixtures, we make them all in-house and subsequently produce the sand castings, permanent mold castings, CNC machining, and ship parts to print to our customers.

M

Monarch Industries Ltd.

Booth 641

51 Burmac Rd.
PO Box 429
Winnipeg, Manitoba R2J 4J3
Canada
www.monarchindustries.com
(204) 786-7921 x235

CINA Exhibitor Directory

As of 3/8/23

A

Aalberts Surface Technologies *

Booth 540

12202 Newburgh Rd.
Livonia, MI 48150
www.aalberts-ht.us
(734) 464-8000

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Alliant Castings *

Booth 643

1200 W 3rd St
Winona, MN 55987
www.alliantcastings.com
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Atlas Foundry Co. Inc. *

Booth 438

601 N Henderson Ave
Marion, IN 46952-3348
www.atlasfdry.com
(765) 662-2525

Atlas Foundry is a jobbing and production foundry specializing in Class 25, 30, and 35 Gray Iron Castings weighing less than 50 pounds. We utilize Disamatic Molding Machines to produce molds for our castings. Production volumes range from 100 mold releases to several thousand molds per release. Our foundry is located in Marion, Indiana about 60 miles to the northeast of Indianapolis. Some of the major markets Atlas Foundry serves include

trucking, agriculture, construction, pumps, Hydraulic parts, compressors, bearings, stadium seating, marine, and industrial equipment. Since 1893.

D

Denison Industries Inc. *

Booth 640

22 Fielder Dr
Denison, TX 75020-8654
www.denisonindustries.com
(903) 786-6500

Denison Industries is your one-stop shop for premium, aluminum castings.

We employ a complete engineering staff that can assist component and casting engineers from design to fit and function to accommodate the end user's casting requirements. Denison Industries is located in Denison, Texas in the North Texas Regional Airport. Our facilities total 229,925 sq feet with 10,000 sq feet of office area 100,000 sq feet of warehouse space and 119,925 sq-foot foundry. We can produce parts sized from 1 lb to 3,000 lbs.

Aluminum alloys 206, 319, 354, C355, 356, A356, A357 and E357 alloys.

N

Neenah Foundry Co. * **Booth 542**
 2121 Brooks Ave
 PO Box 729
 Neenah, WI 54956-0729
 www.nfco.com
 (920) 725-7000

With 150 years of experience, Neenah Foundry, part of Neenah Enterprises, Inc. (NEI), has consistently maintained our industry leadership, delivering value added casting solutions for our customers in the agricultural, construction, HVAC, material handling, and Industrial markets. Now a wholly owned company of Charlotte Pipe and Foundry, NEI is focused on building on our strong foundry know how; how can Neenah Foundry help you with your casting requirements?

O

Osco Industries Inc. * **Booth 634**
 PO Box 1388
 Portsmouth, OH 45662-1388
 www.oscoind.com
 (740) 354-3183

Founded in 1872, Osco Industries is high volume Gray Iron foundry. We have 3 foundries all located in Southern Ohio. Industries served include: A/C & Refrigeration, Sump Pumps, Industrial Power Transmission, Automotive, Agricultural and heavy truck.

P

Palmer Foundry Inc. * **Booth 443**
 22 Mount Dumplin Rd.
 Palmer, MA 01069-1128
 www.palmerfoundry.com
 (413) 283-2976

Palmer Foundry serves a myriad of industries with its premium aluminum castings. While known industry wide for its superior vacuum solutions in the semiconductor industry, as well as long history of serving major industrial applications, Palmer Foundry has significant experience in defense, aerospace, medical, robotics, power generation, metrology and other demanding applications. Palmer Foundry works collaboratively with Original Equipment Manufacturers across the globe to develop best in class castings for their demanding applications.

Pier Foundry & Pattern Shop * **Booth 635**
 51 State St.
 Saint Paul, MN 55107-1408
 www.pierfoundry.com
 (651) 222-4461

Pier Foundry is an ISO certified provider of grey iron, ductile iron and austempered ductile iron castings of superior quality, at a competitive price with one of the shortest lead times in the industry.

We offer over 133 years of manufacturing experience, a knowledgeable and friendly sales staff and a full complement of engineering support and technical services. We encourage our customers to get us involved early in the design process and offer assistance in design and castability from concept through production. Let Pier Foundry be the one stop shop for all of your casting needs.

Product Development & Analysis (PDA) LLC * **Booth 441**
 1776 Legacy Cir. Ste. 115
 Naperville, IL 60563
 www.PDA-LLC.com
 (630) 505-8801

For over 30 years, providing casting, process & rigging design & development for complex castings in various alloys and casting processes, advance casting process simulation including residual stress, micro-structure and properties predictions, and casting conversion. Over the past decade offering specialized services for the design for additive, AM and Industry 4.0 adoption, AI/ML driven data analytics and meta modeling for problem solving, intelligent manufacturing and efficiency improvements, contract research, scrap reduction and modernization utilizing over 60 years of combined experience.

R
Rochester Metal Products Corp. * **Booth 440**
 616 Indiana Ave
 Rochester, IN 46975
 www.RochesterMetals.com
 (574) 223-3164

Rochester Metal Products Corp. has been producing quality gray and ductile iron castings since 1937. Our 200,000-square-foot facility is designed to serve a wide range of casting requirements from .75 pounds to 40 pounds. We offer casting design assistance for new products, from original concept to prototyping and final production. Rochester Metal Products Corp. takes great pride in our decades of commitment to meeting our customers' needs through short cycle times, on-time deliveries, joined by consistent quality and competitive prices.

S

St Marys Foundry Inc. * **Booth 436**
 405 E. South St.
 Saint Marys, OH 45885-2540
 www.stmfoundry.com
 (419) 394-3346

Producing gray and ductile quality iron castings ranging from 1000-60,000 lbs for the oil and gas, pump and valve, and specialty machinery industries.

T

TB Wood's Inc. * **Booth 543**
 440 N. Fifth Ave.
 Chambersburg, PA 17201
 www.tbwoods.com
 (717) 264-7661

For generations, TB Wood 's has developed the technical expertise and staff to design, mold, and machine gray and ductile iron castings that have held up in some of the most demanding environments. From military to industrial, marine to machine tool and far beyond, TB Wood 's castings are found in applications worldwide. TB Wood 's ISO 9001 registered foundry and machining operations can produce parts up to 10,000 pounds per cast. In addition, our complete to print capabilities enable us to satisfy most casting requirements quickly and efficiently.

W

Waupaca Foundry Inc. * **Booth 435**
 PO Box 249
 Waupaca, WI 54981-0249
 www.waupacafoundry.com
 (715) 258-6611

Waupaca Foundry produces iron castings the world uses and trusts. Industry-leading quality, delivery & innovation. Discover the power of true capacity.



2023 AFS Government AFFAIRS FLY-IN

Washington, D.C. June 20-21 The Hotel Washington

Foundry & Supplier Representatives:

Please join us in supporting and defending the Foundry Industry at the 2023 AFS Government Affairs Fly-In!

These issues have millions of dollars of implications for your company: Taxation – Buy America – Trade Enforcement – Workforce Policies - EPA Rulemaking – OSHA Regulations. This is our chance to stand together as one!

Register today at: www.afsinc.org/2023GAfly-in

Hotel reservations at 202-661-2400 or thehotelwashington.com

Ask for AFS Fly-In room block.

2023 Casting Technology Showcase

S-Max® No 1 Sand 3D Printer on the Market

Flexible, production-ready additive manufacturing

The S-Max® line of products are used by foundries worldwide to turn flexible production of any quantity into new business opportunities. Production binder jet 3D printing systems enable more efficient foundry operations with quick-turn sand molds and cores and technology that enables done-in-one pours. S-Max machines are fast, reliable, and precise for the lights-out production of complex molds and consolidated cores.



The ExOne Company

877-773-9663
www.exone.com
Booth 805

Covia Corporation

Foundries depend on Covia's 4+ decades of technical resin coating experience to create formulas that meet their rigorous specifications. Customers can specify and test the sand and the resin to increase productivity of outstanding castings. As the industry's only full-service partner, customers work with Covia foundry experts to solve their complex casting challenges. First-class customer service and advantaged logistics complement this prominent product development.



Covia Corporation

800-243-9004
CoviaCorp.com
Booth 705

LAEMPE REICH

At the core of great foundries. Laempe's CoreCenter is a coreshooter, sand mixer, and gas generator — all under a single controller. Use vertical and horizontal tooling, or a combination of up to 6 parts with no machine changes, or use your existing tooling with a simple conversion. LAEMPE REICH is unique in that we have a research, complete testing, and core production facility.

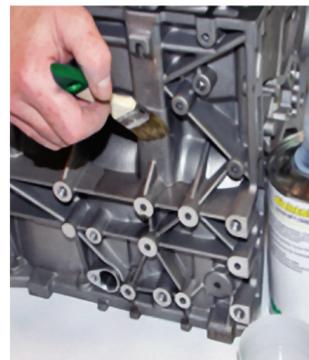


LAEMPE REICH

205-655-2121
www.LaempeReich.com
Booth 605

Porosity Problems? We have the solution.

We are the worldwide leader in solving foundry casting problems. We specialize in eliminating porosity issues and casting defects. Dichtol Sealants use High capillary action to penetrate deep into the porosity, eliminating all leaks without using vacuum impregnation. Our unique product solutions significantly reduce scrap. The Diamant line of products are easy to apply and achieve considerable savings of costs, and time in production.

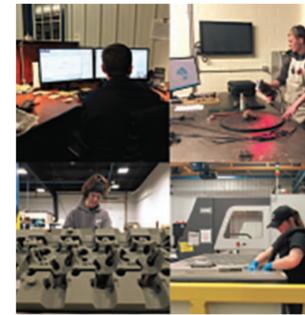


Diamant Polymers, Inc.

Phone: 513-979-4011
www.DiamantPolymersinc.com
customerservice@DiamantPolymersinc.com
Booth 718

Hoosier Pattern

Known for quality of workmanship and commitment to "On Time Delivery," Hoosier Pattern has gained recognition as a premier pattern shop. With some of the latest tools in technology, including five in-house 3D sand printers and over 25 machining centers, HPI is able to provide you with the best quality, pricing and timing. Our highly experienced staff works hand-in-hand with foundries to ensure that all jobs are done right the first time, every time.



HOOSIER PATTERN, INC.

260-724-9430
www.hoosierpattern.com
Booth 616

Ajax TOCCO Magnethermic

Ajax TOCCO continues to be the trusted leader in induction melting equipment and solutions. Our proven applications include a complete line of coreless and channel furnaces for all ferrous and nonferrous melting and holding applications. From simple melt-and-pour systems to sophisticated computer-controlled, energy-efficient melt shops, our line of induction equipment, power supplies, and support provide the most reliable, accurate, and economical solutions for your business.



Ajax TOCCO Magnethermic

800-547-1527
www.ajaxtocco.com
Booth 404

Inductotherm Corp.

Our IGBT-based VIP-I® and SCR-based VIP® units are legendary. They use the lowest kWh/ton to ensure you melt more metal faster, with less energy and kVA of demand. Regardless of changing furnace conditions, these units provide full power — start to finish — for the fastest melting times. When equipped with digital EZ-controls offering advanced diagnostics, these units are the most reliable. Contact us at sales@inductotherm.com



INDUCTOTHERM CORP.

800-257-9527
www.inductotherm.com
Booth 611

REFCOTEC

REFCOTEC, a second-generation family-owned company has been a proud supplier to the North American metal casting industry for over 30 years. In our Ohio and Texas facilities, we manufacture the highest quality foundry products available on the market including refractory coatings, sand additives, resin systems, pastes, partings, and many more. We specialize in custom product formulation, outstanding technical service, and short lead-times. We have products for every metal alloy and all molding methods. Bring us your casting challenges!



REFCOTEC Inc.

330-683-2200
www.refcotec.com
Booth 604

Hitachi High-Tech America

The OE720 and OE750 are groundbreaking OES metals analyzers. Covering the complete spectrum of elements in metal, they also have low detection limits. These spark spectrometers allow you to analyze all main alloying elements and identify exceptionally low levels of tramp, trace and treatment elements in metals. Fast measurement times, high reliability and low operating costs make them invaluable for everyday analysis and total quality control.



HITACHI
Inspire the Next

Hitachi High-Tech America
978-850-5580
hha.hitachi-hightech.com/en/
Booth 214

LAEMPE REICH CoreRoom

We sell em. We use em. When we started the CoreRoom, a core supply company, we chose the same machine we want you to buy. Laempe. And for the same reasons. Quality cores, at high efficiency, at a reasonable price.



Laempe Reich
205-655-2121
www.TheCoreRoom.com
Booth 605

S-Max® Flex Robotic Sand 3D Printing

The newest ExOne binder jet 3D printer, makes sand 3D printing more accessible than ever. Designed for ease-of-use, it is the perfect system for pattern shops and foundries looking to take the first step into the next era of metalcasting. The S-Max Flex robotic sand binder jetting systems helps get products to market faster and with few labor requirements.



The ExOne Company
877-773-9663
www.exone.com
Booth 805

Gradmatic Equipment

Gradmatic Equipment provides an engineered control to meet OSHA's PEL when lining coreless furnaces with silica refractory. Uninterrupted forking produces a denser lining, longer lining life, fewer annual linings and cost savings. Two workers line a furnace regardless of its size. Gradmatic can build a system for furnaces sizes 1 to 85 tons. The system can line a furnace using any particulate material, not just silica.



For more information contact:

Gradmatic Equipment Inc.
705-762-0945
www.gradmatic.com
Booth 215

Weiler Tiger Type 11 Cup Wheels

Introducing the next evolution for portable foundry grinding. From Tiger Ceramic, which provides superior productivity, to Tiger SiC for castings with burnt-in sand, our line offers the performance you need to get the job done fast and done right. Faster material removal translates to better productivity in the cleaning room and less operator fatigue.



Weiler Abrasives
570-595-7495
www.weilerabrasives.com
Booth 919

PEOPLE. TECHNOLOGY. SUCCESS.

We are an international market and technology leader of induction systems for melting, pouring and holding of ferrous and nonferrous metals.



Our success is based on our more than 450 dedicated employees. They provide the perfect combination of proven and innovative technology.

ABP Induction, LLC
732-932-6128
www.abpinduction.com
Booth 629

LAEMPEarSM

When being there soon is not soon enoughSM

You rely on your LAEMPE CoreCenter. And you're skilled at keeping it running at peak performance. But when you need us, you need us now...and sometimes that can't wait until tomorrow. With one of the largest technical staff of experts in our market, standing-by to support you, you can now have us there virtually in a matter of minutes. Through technology, we can be with you, seeing what you see, supporting you in real-time. We can guide you in a way that has never been seen in our industry, without ever getting on a plane, regardless of where we are.



LAEMPE REICH
205-655-2121
www.LaempeAR.com
Booth 605

Inductotherm Corp.

Inductotherm's MiPlant™ Management Information Plant Analytics platform uses state-of-the-art technology to integrate all Inductotherm equipment data with a visual representation for managers to oversee their data in real time. A modern cloud-based, multi-tenant solution, data is collected and securely displayed on your dashboards to help optimize processes, increase efficiency, and manage costs—all while maximizing your equipment's uptime by helping predict problems before they occur.



Inductotherm Corp.
800-257-9527
www.inductotherm.com
Booth 611

Sintex Minerals and Services Inc.

CASTBALL ceramic sand has been designed to produce casting with high quality granting less expansion-defects as veining, metal penetration and burn-on, also providing high dimensional accuracy. Sintex Minerals and Services Inc.



281-239-2799
sales@sintexminerals.com
Booth 328

Weiler Tiger Type 27 Grinding Wheels

Introducing the next evolution for portable foundry grinding. The line is available in three performance tiers, including Tiger Ceramic which sets a new standard for maximum performance. Tiger Ceramic removes up to 40% more material over the life of the wheel compared to competitive zirconia products. This translates to better productivity in the cleaning room and a reduction in abrasives usage.



Weiler Abrasives
570-595-7495
www.weilerabrasives.com
Booth 919

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2023 Awards

Gold Medal

Gregory V. Miskinis

Director of Research and Process Development (retired), Waupaca Foundry, Waupaca, Wisconsin

The **John H. Whiting Gold Medal** ... For significant contributions to the advancement of the cast iron industry as a dedicated and selfless leader, advocate, educator, innovator, motivator, and metallurgist.



Thomas J. Slavin

President, Slavin OSH Group LLC, Chicago, Illinois

The **William H. McFadden Gold Medal** ... For outstanding contributions to environmental, health and safety education and sharing of knowledge within the metalcasting industry and the American Foundry Society to improve the health and safety of metalcasting workers.



Service Citation

Kelley J. Kerns

Director of New Business Development, HA International, LLC, Westmont, Illinois

The **AFS Service Citation** ... For making substantial advancements in the technical, educational, and managerial areas of the foundry industry while tirelessly promoting metalcasting throughout his career.



Scientific Merits

Dr. Steve Dawson

President and CEO, SinterCast, Katrineholm, Sweden

The **AFS Scientific Merit** ... For his knowledge and advancement of material properties, benefits, and production methods for compacted graphite iron and for furthering the metal's applications in automotive, commercial vehicles, and industrial power markets.



Rafael Gallo

Technical Consultant, Pyrotek, Inc., Aurora, Ohio

The **AFS Scientific Merit** ... For his considerable technical contributions to the investigation and analysis of aluminum foundry inclusion and hydrogen metallurgical defects and the recommended practices in molten metal fluxing and degassing treatment processes to minimize and remove them.



AFS Millionaires Safety Award

AFS congratulates the following AFS Corporate Member for achieving a million or more safe-hours worked without incurring a lost time injury or illness during the calendar year 2022:

ASC Engineered Solutions
(Columbia, PA)
1 million safe-hours

EJ
(Elmira, MI)
1 million safe-hours

Grede Castings
(Reedsburg, WI)
2 million safe-hours

Grede Castings
(Menomonee Falls, WI)
1 million safe-hours

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Technical Divisions

Additive Manufacturing Division

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Kirk Rogers
Principal & Founder
M&P Gravity Works LLC

Program Chair:
Dave Rittmeyer
Director of Business Development
Matthews International

Aluminum & Light Metals Division

Chair:
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Technical Specialist
General Motors

Program Chair:
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Cast Iron Division

Chair:
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Vice President
Dotson Iron Castings

Program Chair:
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Manager of Quality and Technical Services
Nenah Foundry Co.

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Program Chair:
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EC&S, Inc.

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Chair:
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Founder
Mad River Strategies LLC

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Metal Technologies Inc.

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Chair:
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Professor
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John Deere Ottumwa Works
John Deere Power Systems
John Deere Turf Care
John Deere Waterloo Works
John Deere Waterloo Works
Joy Mark Inc.
J R Hoe & Sons Inc.
JuggerBot 3D

K

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Kohler Co.
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Kurtz Ersal Inc.
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L

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Lindberg/MPH
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Lodge Mfg. Co.
Louis Meskan Foundry Inc.
LPM North America Inc.

M

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Magnus Metal
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Manley Bros of Indiana Inc.
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Matthews International Corp.
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McWane Ductile
McWane Ductile
McWane Inc.
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Mercury Castings
Mercury Marine
Mercury Marine
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Metal Recycling Services LLC
Metal Technologies Auburn LLC
Metal Technologies Components S De RL De CV
Metal Technologies Inc.
MetalTek International
MetalTek International
MetalTek International
MetalTek International
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Michigan Pneumatic Tool Inc.
Mid City Foundry Co.
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O

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Otto Junker (Junker Inc.)

P

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ProfitGuard LLC
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Progress Rail, a Caterpillar Company
Prototype Casting Inc.
P W Gillibrand Co.

Q

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Quaker City Castings Inc.
Quality Castings Co.
Quality Electric Steel Castings LP
Quality Non-Ferrous Foundry
Quigley Crucible

R

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Rio Tinto Iron & Titanium Inc.

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 River Metals Recycling LLC
 Roberts Sinto de Mexico
 Rochester Metal Products Corp.
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S

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 Superior Graphite Co.
 Supreme Cores Holdings LLC
 Sure-Cast Alum Foundry Co.
 Synchro ERP Ltd.
 Synchro ERP Ltd.
 SYSCON Sensors

T

Taylor Foundry Co.
 TB Wood's Inc.
 TDJ Group Inc.
 Technetronix LLC
 Technical Metal Finishing
 TechniSand Inc.
 TEMC Metal & Chemical Corp.
 Temperform Corp.
 Terves Inc.
 Textron Defense Systems
 Textron Inc.
 The David J Joseph Co.
 The David J Joseph Co.
 The Federal Metal Co.
 The Hill & Griffith Co.
 The Hill & Griffith Co.
 The Knight Insurance Agency Inc.
 The Kolhapur Steel Ltd.
 The Lawton Standard Co.
 The Nugent Sand Co. Inc.
 The Raymond Corp.
 The Raymond Corporation
 Thermotec Industries
 Thermotec Industries
 The Schaefer Group
 The Schaefer Group Inc.
 The Wasmer Company LLC
 T H Mfg. Co.
 Thomas Machine & Foundry Inc.
 Tinker Omega Sinto
 Titan Metallurgy LLC
 Titan Robotics Ltd.
 Tonkawa Foundry Inc.
 Tooling & Equip International
 Torrance Casting Inc.
 Toscelik Profil ve Sac Endustrisi AS
 Townley Foundry & Machine Co. Inc.
 TPI Arcade Inc.
 TPI Arcade Inc.
 Tradesmen International
 Transvalor Americas Corp.

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 Tromley Industrial Holdings Inc.
 Tyler Pipe Co.

U

Unimetal USA Inc.
 United Brass Works Inc.
 United Brass Works Inc.
 Universal Electric Foundry Inc.
 Universal Welding & Engineering Inc.
 Urick Ductile Solutions
 Urschel Laboratories Inc.
 US Aluminum Castings
 US Foundry & Mfg Co.
 US Foundry & Mfg Co.
 US Pipe & Foundry Co.

V

Valmet Inc.
 Van Hydraulics Inc.
 Verichek Technical Services Inc.
 Vermont Castings
 Versevo Inc.
 Victaulic Co.
 Victaulic Co. of America
 Victaulic De Mexico S de RL de CV
 Victaulic Lawrenceville
 Viking Blast & Wash Systems
 Viking Pump Inc.
 Viking Technologies
 Virginia Industries Inc.
 Visio Nerf
 Visio Nerf Inc.
 VJ Technologies Inc.
 voestalpine Railway Systems Nortrak
 Voss Pattern Co.
 Voxeljet AG
 Voxeljet America Inc.
 Voxeljet China Co. Ltd.
 Vulcan Engineering Co. Inc.
 Vulcan Engineering Co. Inc.

W

Wabash Castings Inc.
 Wabtec
 Ward Manufacturing LLC

Washburn Iron Works Inc.
 Washington Mills Hennepin Inc.
 Waterous Company
 Watry Industries LLC
 Waupaca Foundry Inc.
 WDC Acquisition LLC
 Wear-Tek
 Weaver Materiel Service Inc.
 Webb Wheel Products Inc.
 Webb Wheel Products Inc.
 Weil McLain
 Western Foundries Inc.
 West Salisbury Fdry & Machine Co.
 Wexford Sand Co.
 WGB Industries Inc.
 WGS Global Services LLC
 WGS Global Services LLC
 Wheelabrator
 Whibco Inc.
 William Goetz and Associates
 Wirco Inc.
 Wirco Inc.
 Wisconsin Aluminum Foundry Co.
 Wisconsin Oven Corporation
 Wisconsin Precision Casting
 Wisconsin Precision Casting
 Woodland/Alloy Casting Inc.

X

X1 Safety LLC
 XSEL Technologies

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Casting of the Year



CELESTIQ EV Rear Rail
Tooling & Equipment International (TEI)
(Livonia, Michigan)

Material: Proprietary alloy developed for high ductility.
Process: Low pressure precision sand.
Weight: 59.5 lbs.
Dimensions: 58.5 x 22.5 x 33.3 in.
Application: Cadillac CELESTIQ.

Outstanding Achievement



Engine Mount Casting
O'Fallon Casting
(O'Fallon, Missouri)

Material: A356-T6 aluminum.

Process: Investment casting.
Weight: 10 lbs.
Dimensions: 18 x 18 x 11 in.
Application: Structural engine mount.

Outstanding Achievement



AM50 Magnesium Alloy Rear Support Bracket
Meridian Lightweight Technologies
(Strathroy, Ontario, Canada)

Material: AM50A magnesium alloy.

Process: High pressure diecasting.
Weight: 1.93 kg.
Dimensions: 30 x 50 x 56 cm.
Application: Mercedes-AMG.

Newcomer of the Year



Sensor Pod
K&H Precision Products
(Honeoye Falls, New York)

Material: A356 aluminum.
Process: Sand casting.
Weight: 3.25 lbs.

Dimensions: 7.75 x 3.25 x 3.5 in.
Application: Automotive.

Best Example of a Casting Conversion



Burner Box
Metal Technologies Inc.
(Auburn, Indiana)

Material: Ductile iron.
Process: Vertical green sand molding.

Weight: 15.3 lbs.
Dimensions: [Not specified]
Application: Commercial/residential HVAC

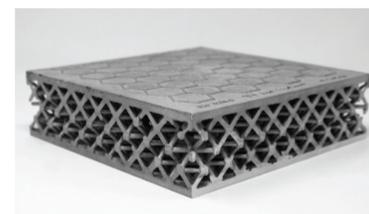
Achievement by a Small Business



Ground Turbine Air Inlet
Morris Bean & Co. (Yellow Springs, Ohio)

Material: A356 aluminum.
Process: Gravity pour nobake sand casting.
Weight: 2,286 lbs.
Dimensions: 73 x 30 in.
Application: Power generation.

Best Prototype or Innovation



Metal-Ceramic Lattice Structure
Virginia Tech
Kroehling Advanced Materials Foundry
(Blacksburg, Virginia)
& Eck Industries
(Manitowoc, Wisconsin)

Material: A206 alloy with 1% TiC nanoparticles.
Process: Gravity-pour sand casting.
Applications: Military and commercial.

AFS Institute Courses

Green Sand Molding 101

May 11-12, 2023 | LIVE ONLINE

This course is an introduction to the green sand molding process used within a metalcasting facility.

Introduction to Metalcasting

May 18-19, 2023 | AFS Headquarters | Schaumburg, IL

This course introduces the process of metalcasting. It provides a broad picture of what happens in a casting production facility, while illustrating the technology, variables and complexity involved in producing a casting.

Metalcasting Process Basics

May 23, 2023 | LIVE ONLINE

This course provides participants with a basic overview of the metalcasting process. Students will trace the path of a casting from quoting through shipping.

Casting Defect Analysis

May 24-26, 2023 | LIVE ONLINE

Participants will become proficient in applying a ten-step procedure that will enable them to analyze and reduce metalcasting defects by correctly identifying defects, root causes, and determining corrective action.

Steel Metalcasting 101

June 1-2, 2023 | LIVE ONLINE

This course provides participants an introduction covering the characteristics and properties of steel, alloying elements and grades of steel, heat treatment, quality control, as well as considerations for working with steel cast parts.

Improving the Effectiveness of Visual Inspection

June 7-8, 2023 | AFS Headquarters | Schaumburg, IL

This course provides you with the information needed to understand the factors of influence on the human task of visual inspection, permitting true quality engineering of this critical operation.

Gating and Riser Design 101

June 14-15, 2023 | AFS Headquarters | Schaumburg, IL

Casting quality and yield are directly impacted by gating design. This course guides participants through the basic functions of gating and risers to provide clean, sound, and functional castings.

Iron Melting 201

June 21-23, 2023 | LIVE ONLINE

This course provides a detailed coverage of iron melting and related processes. Topics include charge materials selection; understanding of cost, value, and risk; information covering electric and cupola melting procedures; refractory lining and more.

Design and Optimization for 3D Sand Printing

June 28-30, 2023 | Missouri S&T | Rolla, MO

This course will cover basic casting design rules comparing traditional sand casting with toolingless 3D sand printing and emphasizing the design freedom that comes with it.

Casting Cost Estimating

July 5-7, 2023 | LIVE ONLINE

Cost estimating is a critical factor in ensuring a manufacturer continues to acquire customers and remains profitable.

Casting Design

July 19-20, 2023 | AFS Headquarters | Schaumburg, IL

This course addresses principles of effective metalcasting design by delving into the major factors that affect final part design.

Process Control for Engineers

August 3-4, 2023 | AFS Headquarters | Schaumburg, IL

Attendees will leave with a set of tools and perspectives on process control that will provide a framework for attacking production and quality problems.

Green Sand Molding 201

August 16-17, 2023 | AFS Headquarters | Schaumburg, IL

This course provides participants with the next level of knowledge related to the sand molding processes used within green sand foundries.

Casting Defect Analysis

August 23-24, 2023 | AFS Headquarters | Schaumburg, IL

Participants will become proficient in applying a ten-step procedure that will enable them to analyze and reduce metalcasting defects by correctly identifying defects, root causes, and determining corrective action.

AFS Upcoming Conferences

2023 Advanced Air Seminar

May 9 – 10, 2023 | AFS Headquarters | Schaumburg, IL

This seminar is for individuals with a basic knowledge and understanding of EPA air regulations and air emission calculations. It will build on basic knowledge with advanced practical knowledge, tools and techniques needed to address relatively complex foundry air emission issues. This two-day seminar will cover four main topics – Emission Estimation, Permitting, Regulatory Requirements and Compliance Demonstration. For each topic, classroom instruction will be followed by a working group session where small groups complete hypothetical air emission problems.

2023 Government Affairs Fly-In

June 20 – 21, 2023 | Hotel Washington | Washington, D.C.

Issues on Capitol Hill have millions of dollars of implications for your company, including taxation, Buy America, trade enforcement, workforce policies, EPA rulemaking, and OSHA regulations. Each year, AFS members from across the entire supply chain gather to advocate for the metalcasting industry, grow the metalcasting economy, and get an inside look at policies that affect the industry.

2023 Management Training and Development Summit

July 12 – 14, 2023 | AFS Headquarters | Schaumburg, IL

Supervisors and human resources professionals will build their skills as metalcasting leaders during the foundry industry's prime event for practical management training. The 2023 Management Training and Development Summit will take place live at AFS Headquarters in Schaumburg, Illinois, on July 12-14. New and experienced leaders in foundry management and HR positions are invited to attend and grow as leaders. The summit is recommended for anyone who handles human resources or personnel management responsibilities in a metalcasting facility.

2023 Foundry Leadership Summit

September 18 – 20, 2023 | The Omni Grove Park Inn | Asheville, NC

Rejuvenate in Asheville, North Carolina, at the 2023 Foundry Leadership Summit, where leaders from all corners of the metalcasting industry will gather in an energizing setting for highly rated speakers, thought-provoking discussions, and rich networking opportunities.

Explore the profound changes sweeping the worlds of manufacturing, technology, economics, trade, and politics. You'll emerge refreshed, renewed, and ready to embrace the future.

2023 Copper Alloys Workshop

Sept. 27 – 28, 2023 | AFS Headquarters | Schaumburg, IL

This workshop is tailored for new and experienced copper alloy manufacturing professionals. We have 15 sessions scheduled over 2 days; each session will be led by industry experts in their respective fields. We will have topics on green sand systems, gating and risering, metallurgy, additive manufacturing, quality inspection, foundry safety, and backed by popular demand we will have a panel on casting defects.

35th Environmental, Health and Safety Conference

October 3 – 5, 2023 | Palmer House | Chicago, IL

The annual AFS Environmental, Health & Safety Conference is the singular event for foundry industry EHS professionals to network, benchmark and learn from each other.

2023 Practical Cupola Workshop

Oct. 10 – 11, 2023 | Evergreen Golf Resort | Cadillac, MI

The 2023 Practical Cupola Workshop explores the fundamentals of foundry cupola operation. Presented by the AFS Cupola Technical Committee, topics reflect the expertise and experience of its industry-leading presenters, who are cupola operators and suppliers.

2023 AFS Future Leaders of Metalcasting Annual Meeting

Oct. 23-25, 2023 / Blue Harbor Resort / Sheboygan, WI

Rising metalcasting leaders are invited to the Blue Harbor Resort in Sheboygan, WI, to experience an immersive networking event from AFS Future Leaders of Metalcasting (FLM). FLM is for foundry industry professionals who are 20 to 45 years old and who are on, or aspire to be on, a leadership track in their careers.

2023 Additive Manufacturing Conference

November 7 – 8, 2023 | The Henry Hotel | Dearborn, MI

Designer, operator, casting buyer or supplier, the 2023 Additive Manufacturing Conference is a must-attend event. Industry experts in additive manufacturing including academia and foundry professionals will lead sessions covering a comprehensive range of additive manufacturing disciplines from designing for additive manufacturing, to 3D printed sand molds & cores, printed hard tooling & fixtures, hybrid applications, and the latest in additive manufacturing applied research.



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