Discover **Tomorrow** Today

CastExpo.com | Produced by the American Foundry Society

APRIL 12 - 15, 2025 ATLANTA, GEORGIA

CASTEXPO

& METALCASTING CONGRESS

connecting SUPPLIERS | METALCASTERS | CASTING BUYERS

Presenting the WFO Technical Forum

Pre-Show Guide

It's back: CastExpo returns to the Georgia World Congress Center in Atlanta on April 12-15, 2025 – and you can experience it live!

Explore the Future of Metalcasting.

The latest trends in smart manufacturing. The newest equipment for your plant. The best in research and expertise. Get a head start on the competition by exploring tomorrow's metalcasting advancements today.

Discover Limitless Opportunities.

Full-scale exhibits. Interactive demonstrations. And a direct connection with top suppliers, metalcasters, and service providers. Discover how you can maximize your operations – and your profitability – at *CastExpo 2025*.

Network With the Best.

CastExpo 2025 brings together a worldwide community of professionals who aim to grow their businesses and their careers. From industry veterans to rising leaders, you'll make connections to count on throughout your career.

Register now at www.CastExpo.com.

What You'll Experience at CastExpo 2025

Education & Research

CastExpo 2025's unparalleled educational and research content covers every major alloy, process, and related foundry topic, including technical and management matters.

Selected session topics include:

- Additive Manufacturing
- Casting Design & Purchasing
- Engineering
- Environmental, Health & Safety
- Ferrous & Non-Ferrous Alloys
- Industry 4.0
- Marketing & Sales
- Melting
- Molding
- Pouring
- Quality Control
- Workforce Development
- Women in Metalcasting
- Young Professionals

Lectures, Keynotes, & Special Events

From the world-renowned Hoyt Memorial Lecture to engaging keynotes, banquets, and awards presentations, *CastExpo 2025* highlights the best in industry knowledge-sharing and honors.

Supplier Exhibits

Hundreds of worldwide suppliers to the metalcasting industry will showcase cutting-edge products, services, and technology for metalcasters, from consumables to equipment to consulting.

Foundry Exhibits (Cast in North America)

Leading North American foundries will share the latest services and capabilities with designers, buyers, and OEMs in the capstone of the supply chain, the Cast in North America (CINA) pavilion.

Exhibits, Papers, and Panels on:

- Advanced Process Automation
- **Advanced Robotics**
- Additive Manufacturing
- **A.I. & Machine Learning**
- Augmented Reality & Virtual Reality
- Big Data & Analytics
- Casting Conversions
- **Cybersecurity**
- Defect Elimination & Casting Quality
- Design Optimization & Light-Weighting
- Energy Efficiency
- Environmental, Health & Safety
- Ferrous & Non-Ferrous Castings (in CINA)
- Foundry Equipment
- **Industrial Internet of Things**
- Insurance, Financial Solutions & Consulting
- Machining & Finishing
- Metallurgy & Melt Quality
- Molds, Binders & Additives
- Public Policy & Regulation
- Reshoring
- Sand Quality
- Simulation
- Supply Chain & Logistics
- **Foundry 4.0**
- Wearable Technologies
- Workforce Success

The WFO Technical Forum

The World Foundry Organization (WFO) will co-locate with AFS and present the 2025 World Foundry Technical Forum in Atlanta. The WFO is the recognized center of strategic foundry knowledge at the global level, designed to develop, enhance and improve the production of metalcastings through the latest technical and sustainable industry practices. The World Foundry Technical Forum is held once every two years.

Keynote and Hoyt Lecture Speakers

Saturday, April 12, 10:30 – 11:30 a.m.

Success is a Journey, Not a Destination

Dominique Dawes
3-Time Olympic Gymnast, Olympic Gold Medalist; First African American Gymnast to Qualify for the Olympic Games

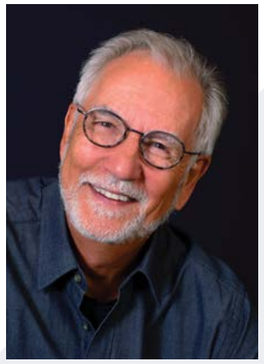
From Olympic Gold Medalist to Broadway, and from television analyst to President of the Women's Sports Foundation, Dominique Dawes continues on a path to inspire, motivate and lead. Dawes is best known for her tremendous success as an Olympic gymnast who competed in three Olympic Games (1992, 1996, and 2000), won four Olympic medals, and has a permanent place in the U.S. Olympic Committee Hall of Fame. Fans across the nation and around the world remember her as a member of the gold-medal-winning "Magnificent Seven" at the 1996 Atlanta Games, where she also won a bronze medal as she wowed the crowd with her stunning performance in the floor exercise, becoming the first female African American gymnast to win an individual medal. She also earned a bronze medal with the U.S. team in the 1992 Barcelona Games and left an imprint in the sports world with her "back-to-back" tumbling pass. Dominique made a surprising comeback with an anticlimactic end in the 2000 Sydney Games. Dawes presentation will focus on empowering audiences to embrace a team mentality, use failure as fuel, and believe in the power of their dreams.

Sunday, April 13, 10:30 – 11:30 a.m.

Principles for Leading High-Performance Teams

Scott Moore
Expert on Building and Leading "No-Fail" Teams and United States Navy SEAL Rear Admiral (ret.)

Having served 30 years as a SEAL leader, retired Rear Admiral Scott Moore is a master in organizational leadership and teambuilding. He served in every leadership position in the SEAL teams, including the former commander of the Naval Special Warfare Development Group, and closed out his career as the number two leader in the entire SEAL organization. He led the military's elite forces through more than 2,000 of our nation's most extreme, high-stakes missions and was deployed on SEAL team operations across the globe. He understands the importance of leadership and cohesiveness like few others can, and his experience runs the gamut from leading small groups to large-scale tactical planning. From the mountains of Afghanistan to briefings in the Oval Office, Moore is the man our leaders trusted when failure was not an option. Moore will share stories of teamwork in life-and-death circumstances and insights on recruiting, training, and equipping teams that exceed expectations.



Monday, April 14, 10:30 – 11:30 a.m.

Hoyt Memorial Lecture - Servant Leadership: A Leadership Concept for Today's World

Frank Headington
Retired, Neenah Foundry

Our world is a mess. People are suffering to some degree or another everywhere we look. One major reason the world is like this is that people are using the power model of leadership which focuses on power and control. That coupled with the reduction in interpersonal communications has created a more divisive climate at work and in our government relations with our citizens. Servant leadership is about serving people, not using people. Serving others is the most meaningful and satisfying way for leaders to live and lead. It begins with "the natural feeling that one wants to serve."

Since starting at Neenah Foundry in 1989, Frank Headington has over 49 years of foundry experience. He has a Master's of Science in Industrial Management from Georgia Institute of Technology and a Master's of Science in Ceramics Engineering from the University of Illinois at Urbana-Champaign. Respected for his expertise in metalcasting, Headington was the 2016 recipient of the AFS Peter L. Simpson Gold Medal. Headington has been an active member of AFS serving on numerous technical committees, the AFS Board of Directors, AFS Research Board and as AFS staff holding the position of Interim Technical Director from 2017-2020.

Keynote and Hoyt Lecture Speakers Cont.

Tuesday, April 15, 10:30 – 11:30 a.m.

Reshoring Update for North American Foundries

Harry Moser
Founder, The Reshoring Initiative

Reshoring and foreign direct investment (FDI) have brought back over 700,000 U.S. manufacturing jobs in recent years. At the same time, the COVID crisis demonstrated the risk of long supply chains. These trends have drawn attention to the advantages of reshoring and nearshoring.

Harry Moser, Founder of the Reshoring Initiative, will provide fresh new examples of how U.S. foundries are taking advantage of the trend toward shorter supply chains and what that means for your company and your customers. Plus, discover how Reshoring Initiative's Total Cost of Ownership Estimator and the Import Substitution Program can help your company land contracts that otherwise would have gone overseas.

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Show Location & Schedule

Georgia World Congress Center

285 Andrew Young International Blvd. NW
Atlanta, GA 30313

Saturday, April 12	Sunday, April 13	Monday, April 14	Tuesday, April 15
8 a.m. – 4:45 p.m.	**8 a.m. – 4:45 p.m.**	**8 a.m. – 4:45 p.m.**	**8 – 10:15 a.m.**
Technical & Management Sessions	Technical & Management Sessions	Technical & Management Sessions	Technical & Management Sessions
8 – 10 a.m.	**8 – 10 a.m.**	**8 – 10 a.m.**	**8 – 10 a.m.**
AFS Institute Course: Metalcasting Process Basics —Part One	AFS Institute Course: Introduction to Quality and Process Improvement —Part One	AFS Institute Course: The 10-Step Method for Corrective Action—Part One	AFS Institute Course: Introduction to Casting Design
8:45 – 9 a.m.	**9 a.m. – 5 p.m.**	**9 a.m. – 5 p.m.**	**9 a.m. – Noon**
Ribbon-Cutting Ceremony	Exhibits Open	Exhibits Open	Exhibits Open
9 a.m. – 5 p.m.	**9:15 a.m. – 4:45 p.m.**	**9:15 a.m. – 4:45 p.m.**	**9:15 – 10:30 a.m.**
Exhibits Open	Designer & Buyer Track Sessions	Designer & Buyer Track Sessions	Designer & Buyer Track Sessions
9:15 a.m. – 4:45 p.m.	**10:30 – 11:30 a.m.**	**10:30 – 11:30 a.m.**	**10:30 – 11:30 a.m.**
Designer & Buyer Track Sessions	Keynote Speaker: Scott Moore	Hoyt Memorial Lecture: Frank Headington	Keynote Speaker: Harry Moser
10:30 – 11:30 a.m.	**11:45 a.m. – 1:15 p.m.**	**11:45 a.m. – 1:15 p.m.**	**Noon**
Keynote Speaker: Dominique Dawes	Volunteer Leadership Awards Luncheon *(Ticket required)*	Past Presidents' Luncheon *(Registration required)*	Conclusion of CastExpo 2025
11:45 a.m. – 1:15 p.m.	**1:30 – 4:30 p.m.**	**1:30 – 3:30 p.m.**	
Copper Division Luncheon *(Ticket required)*	AFS Institute Course: Introduction to Quality and Process Improvement —Part Two	AFS Institute Course: The 10-Step Method for Corrective Action—Part Two	
1:30 – 2:45 p.m.	**6 – 7 p.m.**	**5 – 6 p.m.**	
IJMC-FEF Student Research Competition	Annual Banquet Reception *(Cashless bar)*	AFS Young Professionals Reception	
1:30 – 3:30 p.m.	**7 – 9 p.m.**	**6 – 9 p.m.**	
AFS Institute Course: Metalcasting Process Basics —Part Two	Annual Banquet *(Ticket required)*	AFS Alumni Dinner *(AFS Alumni only. Ticket required)*	
3 – 4 p.m.	**9 – 10 p.m.**		
SFSA Cast in Steel Competition	President's After Party *(Cashless bar)*		
5 – 6:30 p.m.			
Welcome Reception *(Ticket required)*			
6:30 – 8 p.m.			
Women in Metalcasting Dinner *(Ticket Required)*			

Schedule is subject to change.

AFS Institute Courses

From the leader in metalcasting education comes select courses for metalcasting professionals. The AFS Institute offers several immersive classes at ***CastExpo 2025***, included with the ***All-Access Pass Including Education Track***.

Available Courses:

Saturday, April 12	Sunday, April 13	Monday, April 14	Tuesday, April 15
8 – 10 a.m.	**8 – 10 a.m.**	**8 – 10 a.m.**	**8 – 10 a.m.**
AFS Institute Course: Metalcasting Process Basics —Part One *Patrick Kluesner, Grede Castings*	**AFS Institute Course: Introduction to Quality and Process Improvement —Part One** *Ted Schorn, Enkei America Inc.*	**AFS Institute Course: The 10-Step Method for Corrective Action—Part One** *Patrick Kluesner, Grede Castings*	**AFS Institute Course: Introduction to Casting Design** *Jiten Shah, Product Development & Analysis LLC*
1:30 – 3:30 p.m.	**1:30 – 4:30 p.m.**	**1:30 – 3:30 p.m.**	
AFS Institute Course: Metalcasting Process Basics —Part Two *Patrick Kluesner, Grede Castings*	**AFS Institute Course: Introduction to Quality and Process Improvement —Part Two** *Ted Schorn, Enkei America Inc.*	**AFS Institute Course: The 10-Step Method for Corrective Action—Part Two** *Patrick Kluesner, Grede Castings*	***New this year!*** Visit AFS Institute staff at Booth #655.

Casting Source Theater Schedule

The Casting Designers & Buyers track at ***CastExpo 2025*** provides hard-to-find training for engineers, supply chain pros, and OEM representatives. Led by experts in their fields, these sessions are included with an Exhibits Pass.

Saturday, April 12	Sunday, April 13	Monday, April 14	Tuesday, April 15
9:30 – 10:30 a.m.	**9:30 – 10-:30 a.m.**	**9:30 – 10:30 a.m.**	**9:30 – 10:30 a.m.**
Predicting Cast Steel Alloy Properties Based on Composition and Heat Treatment	**When to Convert a Weldment to a Casting**	**Reducing Defects and Improving Quality**	**Rapid Prototyping and Advanced Manufacturing**
12:30 – 1:30 p.m.	**12:30 – 1:30 p.m.**	**12:30 – 1:30 p.m.**	
10 Practical Ways to Reduce Cost on Your Casting Program	***Casting Source* Panel**	**The Questions You Should Be Asking a Potential Foundry Partner**	
1:30 – 3 p.m.	**1:30 – 2 p.m.**	**1:30 – 2:30 p.m.**	
IJMC Student Research Competition	**Casting of the Year 2024: St. Marys Foundry**	**Alloy Selection**	
3:30 – 4:30 p.m.	**2:15 – 3:15 p.m.**	**3 – 4 p.m.**	
Practical vs. Pretty - Surface Finish	**Update on AFS Project for Digitizing Various Knowledge Platforms**	**Casting Dreams Competition**	

Schedule is subject to change.

Register Early! Buy your pass at *www.castexpo.com*

All-Access Pass Including Education Track - or - Exhibits Pass

For complete access to all that ***CastExpo 2025*** has in store, including technical and management sessions, AFS Institute courses, keynotes, the Hoyt Memorial Lecture, and the exhibit floor, the ***All-Access Pass Including Education Track*** is the way to go.

If your plan is to view the exhibits plus keynotes and the Hoyt Memorial Lecture only, the ***Exhibits Pass*** is right for you.

	Exhibits Pass	All-Access Pass Including Education Track
Exhibit Floor	■	■
Keynote Speakers	■	■
Hoyt Memorial Lecture	■	■
Cast in North America	■	■
Casting Designers and Buyers Track	■	■
AFS Institute Courses		■
Technical Sessions		■
Management Sessions		■
WFO Technical Forum Sessions		■

Significant discounts are available for American Foundry Society members and those who register early. Current student members of AFS receive free admission. You can register online at ***www.castexpo.com***.

For information on becoming an AFS member, visit ***www.afsinc.org/join-afs***.

Special events, including the Copper Division Luncheon, Volunteer Leadership Luncheon, and Annual Banquet require a special ticket offered for purchase at registration. Pricing, details, and sign-up are on the back of the registration form.

Lodging & Travel

AFS has secured rates between $197-$249 per night for room blocks at several hotels. The host hotel is *Omni Atlanta Hotel* at *Centennial Park, 100 CNN Center Atlanta, GA 30303*. Visit ***www.castexpo.com*** for a full list of event hotels.

For more information on housing and airfare, go to ***www.castexpo.com***.

Connect With Us

The ***CastExpo 2025 App*** gives exhibitors and attendees a way to stay connected. The app includes a complete listing of all speakers, searchable directory of all sessions and exhibitors, personal list of all your registered sessions, viewable floor map, and much more. Look for the app in April 2025!

Share your experiences with us on social media or keep up-to-date with the latest developments at www.castexpo.com.

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American Foundry Society

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APRIL 12 - 15, 2025 ATLANTA, GEORGIA

CASTEXPO & METALCASTING CONGRESS

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Presenting the WFO Technical Forum

Mail registration form to:
CastExpo 2025
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1695 N. Penny Ln.
Schaumburg, IL 60173
- or -
Register online at:
CastExpo.com
- or -
Fax to: 847-824-7848

Name _____ Title _____ Member ID# _____

Company _____ Address _____

City _____ State/Province _____ Zip/Postal Code _____ Country _____

Telephone _____ E-mail address _____

Spouse's/Domestic Partner's Name (if attending) _____

CastExpo 2025 Registration	Early Registration	Standard Registration	Onsite Registration
	Through Feb. 16, 2025	Feb. 17 – April 11, 2025	April 12–15, 2025
Members			
Exhibits Pass	$85	$115	$130
All-Access Pass including Education Track	$650	$750	$825
Non-Members			
Exhibits Pass	$195	$230	$250
All-Access Pass including Education Track	$800	$925	$975
Spouse/Domestic Partner	$85	$115	$130
Pre-Order Transactions 2025	$525 - Member | $700 - Non-member		

☐ Your email address will be used to communicate all registration information and will also be provided to exhibiting companies. Please check here if you do not wish to have your email address included in the post-show attendance file provided to exhibiting companies.

Attention Students and Honorary Members:

STUDENTS
☐ Registration for AFS student members is complimentary. Please provide a copy of a valid student ID with your registration form and check here.

HONORARY
☐ Honorary members receive complimentary registration. Please check here.

Register For:

Members:
☐ **Exhibits Pass**
☐ **All-Access Pass including Education Track**

Non-Members:
☐ **Exhibits Pass**
☐ **All-Access Pass including Education Track**

Spouse/Domestic Partner:
☐ **Spouse/Domestic Partner Registration**

Pre-Order Transactions 2025
☐ **Member**
☐ **Non-Member**

Registration Total _____

Special Events Total* _____

Final Total _____

Payment Must Accompany Registration (US Dollars Only)

☐ Check (Payable to American Foundry Society) ☐ American Express® ☐ MasterCard® ☐ Visa®

Credit Card Account Number _____ Exp Date _____ CVC (Security Code) _____

Cardholder's Signature (Required for Processing) _____ Cardholder's Name (Please Print) _____

**See back of form for Special Events tickets, pricing, and descriptions.*

Children under 16 are permitted if accompanied by an adult and with a signed waiver. No cameras are permitted.

Cancellation/Substitution Policy—Cancellation/Substitution Policy—Cancellations must be received in writing by March 15, 2025. Refunds on registration fees will be subject to a $25 administration fee. Refunds on Special Event tickets will not be subject to the administration fee but must also be received in writing by March 15, 2025. There will be NO REFUNDS after March 15, 2025. Substitutions will be accepted at any time. Send cancellation requests to registration@castexpo.com.

	Quantity	Fees
Copper Division Luncheon $75 (Saturday, April 12 | 11:45 a.m.)		
Welcome Reception $40 (Saturday, April 12 | 5 p.m.)		
Volunteer Leadership Awards Luncheon $75 (Sunday, April 13 | 11:45 a.m.)		
Annual Banquet $140 (Sunday, April 13 | Cashless bar reception 6 p.m. | Banquet 7 p.m.)		
Alumni Dinner at the College Football Hall of Fame $150 (Monday, April 14 | 6 p.m.) Must be AFS Alumni to attend		
	Total	

Special Event Descriptions

Copper Division Luncheon

Saturday, April 12 | 11:45 a.m. | $75

The Copper Division Luncheon will feature a speaker of general interest from the Atlanta area and the Copper Division will present their annual awards. The luncheon is open to everyone with an interest in copper alloys.

Welcome Reception

Saturday, April 12 | 5 p.m. | $40

AFS welcomes all attendees to kick off CastExpo 2025 with a reception in the convention center. The reception provides the opportunity to meet with customers, vendors, and other attendees. Cocktails and hors d'oeuvres will be served.

Women in Metalcasting Dinner

Saturday, April 12 | 6:30 p.m. | Ticket Required

This event is open to AFS members of Women in Metalcasting. It includes dinner, networking, the presentation of the AFS Women in Metalcasting Award for Excellence, and the presentation of the Jean Bye AFS Women in Metalcasting Scholarship. For more information or to RSVP for this event, please contact Women in Metalcasting liaison Katie Matticks at kmatticks@afsinc.org. Non-AFS members will have to pay a fee of $75 to attend.

Volunteer Leadership Awards Luncheon

Sunday, April 13 | 11:45 a.m. | $75

Join us for a fun, fast-paced awards luncheon. 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 including the presentation of the Scientific Merit and Service Citation awards.

Annual Banquet

Sunday, April 13 | Cashless bar reception 6 p.m.
Banquet 7 p.m. | $140

Join us for business networking and the presentation of the highest AFS honor, the Gold Medal and the WFO Jozef Suchy Award. 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.

Alumni Dinner at the College Football Hall of Fame

Monday, April 14 | 6 p.m. | $150

Alumni will experience the College Football Hall of Fame touring the special exhibits and permanent installations, while enjoying bold American cuisine. Must be a member of AFS Alumni to attend.

About our Host City

Atlanta, Georgia

The Southern city where history meets modernity.

As Georgia's largest city and the principal trade and transportation center of the southeastern United States, Atlanta serves as the quintessential capital city of the Southeast. It is the core of an extensive metropolitan area that includes 20 counties and cities with a robust and vibrant population. Atlanta is also home to the Hartsfield-Jackson Atlanta International Airport (ATL). It is the nation's most traveled airport serving 275,000 passengers per day on over 2,700 flights. In fact, 80% of the U.S. population live within a two-hour flight of ATL. Atlanta is also easily accessible by car – it's less than 1,000 miles from New York City, Toronto, Chicago, Houston, Philadelphia, San Antonio, Dallas, Detroit, Ottawa, Jacksonville, Indianapolis, Columbus, Austin, Milwaukee, Boston, Washington, Nashville, Cleveland, New Orleans, Memphis, Charlotte, Baltimore and Kansas City.

Local Attractions

Georgia Aquarium

Georgia Aquarium contains more than 70 amazing habitats, with thousands of marine animals such as whale sharks, manta rays, beluga whales, and more. Don't miss out on the animal encounter programs, where you can get up close and personal with dolphins, penguins, and sea lions.

Atlanta Botanical Garden

Step into a world of magic and serenity at the Atlanta Botanical Garden, where features like the Fuqua Orchid Center treat visitors to a rare collection of high-elevation orchids never before grown in the southeast.

World of Coca-Cola

Immerse yourself in World of Coca-Cola, the one and only place you can explore the story of the world's most popular beverage brand. It's a place where anyone can experience moments of happiness and wonder.

Centennial Olympic Park

Built for the 1996 Summer Olympic Games, this public park offers weekly free concerts, a dancing water fountain for the kids and a memorial quilt in remembrance of the victims of the 1996 Olympic bombing.

Ponce City Market

Along the Atlanta Beltline Eastside Trail, Ponce City Market is one of Atlanta's favorite gathering spots. In 2014, Ponce City Market renovated the old Sears & Roebuck building populating it with retail, office space and dining.

High Museum of Art

This stunning, porcelain-enameled building was designed by famed architect Richard Meier and is rivaled only by the art inside. Featuring American, European and African art, as well as decorative art and photography, the High Museum boasts a permanent collection of over 11,000 pieces.

2025 Show Schedule

Friday, April 11, 2025

9 a.m. – 6 p.m.

Georgia World Congress Center Lobby

Registration Open

Attendee bags sponsored by:

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Saturday, April 12, 2025

7 – 8 a.m.

Room: A302

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 a.m. – 6 p.m.

Georgia World Congress Center Lobby

Registration Open

Attendee bags sponsored by:

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7:30 - 10:30 a.m.

Outside Technical and Management Sessions

Coffee Station by AFS Technical and Management Sessions

Coffee station sponsored By:

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8 – 9 a.m.

Cast Iron Division

Room: A311

Session Chairs:

Kathy Hayrynen
Aalberts Surface Technologies, Livonia, MI

Eric Nelson
Eric Nelson Consulting LLC, Mankato, MN

Survey of Magnesium Morphology in Chill Sample Castings Used for Spectrometer Analysis (25-136)

Haruki Itofuji, I2C Technology Institute, Yamaguchi, Japan

In slowly cooled sample castings, magnesium (Mg) existed as halo-like distribution around graphite nodules in former studies. In this study, Mg distribution in rapidly cooled sample castings, which had ledeburite(chill) structure and graphite nodules, was surveyed by electron prove microanalyzer (EPMA). The analyzed surface was milled using focused ion beam (FIB). As the results, Mg segregation was detected at voids and at entire section of graphite nodules. The reasons why they existed there were considered from the points of Mg characteristic and the mechanism of spheroidal graphite (SG) formation. Here, the formation mechanism on Mg halo is considered and the schematic illustration is introduced. Site theory, which proposed as the graphite spheroidization theory in 1996 by author, will be able to go more to the next step.

Development of New Certified Reference Materials for Silicon Metals (25-043)

David Kesse and Robert Logan, Elkem Materials, Inc., Pittsburgh, PA; Anette Toverad, Astrid Storesund, Vijtha Gengatharan, Alf Yngve Guldhav, Hege Teisrud, and Kjell Einar Blandhol, Elkem, Kristiansand, Norway; Sylwia Kozlowicz, Daniel Tapa, Jadwiga Charasinka, Michal Jadwinski, Magdalena Grzegorczyk, Andrzej Hryniszyn, Izabela Maj, Sonia Kasierot, Magdalena Knapik, Adrian Pietrzik, Ewelina Musielak, Ewa Jamroz, Marta Wolska, Tadeusz Gorewoda, Justyna Kostrzewa, and Jacek Anyszkiewicz, Łukasiewicz Research Network, Poland

A metalcaster relies on vendors to provide high quality, consistent products ensuring high quality castings are manufactured. Metalcasters ensure their chemistry through standardizing their chemical analysis equipment through the use of Certified Reference Materials (CRM). But what if those standards did not exist? How could a foundry gage themselves against another? How could a customer ensure that product from two different vendors would function the same? This was the case for the silicon metal industry. No common standards existed resulting in divergent readings of the same material from different analytical laboratories. Furthermore, differences in actual chemical analysis between vendors, supposedly produced to the same specification, are commonplace. This paper discusses the cooperative development and certification of nine new international CRM's for the silicon metal industry.

8 – 9 a.m.

Copper Division

Room: A312

Session Chair:

Paul Clements
Sloan Valve Co., Augusta, AR

Lead-Free Copper Alloys Development (25-039)

Kumar Sadayappan, Canmet MATERIALS, Ontario, Canada; Maheswar Sahoo, Suraj Consulting, Ontario, Canada

Copper alloys containing lead were regularly used for drinking water applications. In response to the call to reduce the lead content in drinking water, the copper foundry industry introduced many lead-free alloys in the early 1990's. Bismuth containing alloys, developed in the AFS led consortium, were introduced in 1996. Since then, these alloys have evolved and replaced many lead containing copper alloys in drinking water applications all over the world. Industry adopted new processing technologies and testing methods to make the lead-free alloys widely usable in an affordable way. This paper reviews these developments since the early announcements.

Melting Characteristics of Copper Alloys in Pellet or Granule Form (25-060)

Gregory Svoboda, I. Schumann & Co. LLC, Bedford, OH; Charles Wood, Wieland Chase, LLC, Coldwater, MI

Comparison of melting characteristics of copper alloys in traditional ingot form as opposed to pellet or granule form. The comparison would include such parameters as:

- Melt rate
- Dross/slag formation
- Resulting grain structure
- Gas entrainment
- Electrical power consumption (induction melting)
- Material handling (furnace charging)
- Short and wide freezing range alloys

Molding Methods & Materials Division

Room: A313

Session Chairs:

Chris Lee
Carpenter Brothers, Inc., Kalamazoo, MI

Jerry Thiel
Precision Casting Technologies, Dysart, IA

Use of Large Mini-Risers for Yield Increase and Cost Savings (25-047)

David Heckman, Lee Horvath, and Sean Harmon, ASK Chemicals, Columbus, OH

The use of insulating or exothermic riser sleeves over natural risers has established as good foundry practice as a source of extra metal to combat metal shrink defects and improve casting yield. Mini-risers have been developed to further increase the yield and reduce casting contact. Mini-risers were typically limited in size to displace risers under 6 inches in width. A new subset of XL "mini" risers have been developed to reduce large riser size by up to 50% . Significant weight can be removed from the riser portion of ductile iron and steel castings. Made via a cold box resin process, they have a high dimensional accuracy with exceptional breakdown during shakeout. This paper reviews methodology and examples of casting improvement/cost savings with XL technology.

Novel PEP-SET System to Improve Productivity and Reduce Production Cost (25-158)

Fernando Guzman, ASK Chemicals, Nuevo Leon, Mexico

A comparison of thee PEP-SET systems were performe, an old version, a new development and a high performance binder, in order to compare properties such as tensiles, gas evolution and smoke generation looking for the best option to decrease defects, rework and save money.

World Foundry Organization

Room: A314

Session Chairs:

Adam Kopper
Brunswick Corp., Fon du Lac, WI

Brad Muller
Charlotte Pipe & Foundry Co., Oakboro, NC

Casting the Future of a Strategic Industry: Thoughts on the Situation and Global Challenges for Foundry (25-188)

Jose Javier Gonzalez, World Foundry Organization, Bilbao, Spain

As the rest of the manufacturing activities around the globe, the Foundry industry is facing now a perfect storm, surrounded by supply chain disruptions, high raw materials and energy costs, market shifts or the process for industrial decarbonization, among others.

The purpose of this presentation is to help our companies identifying some of the keys of the actual global situation, to support their navigation through this complex moment. Starting from the learning from the medium-term impacts of Covid19 in the industry, the work deeps into some global uncertainties and some actual facts affecting the metalcasting market, including new and accelerated challenges.

The situation in big metalcasting producers like China or India will be analyzed in light of these challenges.

Finally, the work shares some thoughts and strategies for the future which are based on drivers supported on the ability to connect with the global foundry network, creating some actual dynamics in the industry that can allow our managers to take better decisions in these very complex circumstances.

8 – 10 a.m.

The AFS Instiute

Room: A316

Metalcasting Process Basics: Part One (25-149)

Patrick Kluesner, Grede Castings, Waterford Township, MI

This course provides a basic overview of the metalcasting process, tracking the path of a casting from quoting through shipping. Common metalcasting terms and highlights from the activities inside the major departments of a metalcasting production facility will be covered. Ideal for those new to the metalcasting industry.

8:45 – 9 a.m.

Exhibit Hall A1 Entrance

Ribbon Cutting Ceremony

Celebrate the start of CastExpo 2025 with a ceremonial ribbon-cutting with the AFS Executive Board.

9 a.m. – 5 p.m.

Exhibit Hall A1-3

Exhibits Open

9:15 – 10:15 a.m.

Cast Iron Division

Room: A311

Session Chairs:

Brad Steinkamp
Charter Dura-Bar, Crystal Lake, IL

Brandon Reneau
Caterpillar, Inc., Dunfermline, IL

Generative Gating Method and Case Study (25-021)

Evan Letourneau, MAGMA Foundry Technologies, Schaumburg, IL

This study presents a novel method for generating gating systems directly from metalcasting process simulation results. Traditionally, skilled engineers design gating systems in CAD software, relying on established calculations and geometric features. While simulation software verifies runner performance and allows for adjustments, the design process can be labor intensive. Here, we propose a Generative Gating Method that leverages simulation data to automate gating design. The objective of Generative Gating is to produce effective runner systems that can be produced quickly and by engineers with less experience in gating design. This methodology is applied to a real-world casting scenario, replacing the existing gating system with an automatically generated design. Casting samples produced using both approaches are evaluated and compared for quality. Finally, the advantages and limitations of the proposed gating generation method are discussed.

Improved Prediction of Shrinkage Defects in SGI Castings Considering Expansion/ Contraction Behavior and Mold Characteristics (25-087)

Yutaka Miyamoto, Ube Steel Co., Yamaguchi, Japan; Jun Sasaki, Daihatsu Metal Co. Ltd. Shimane, Japan; Takeshi Nakano, Tsuchiyoshi Industry Co. Ltd., Hiroshima, Japan; Haruki Itofuji, I2C Technology Institute, Yamaguchi, Japan

The effect of cooling due to the latent heat of evaporation of water and the mold wall movement were assumed as factors by observing shrinkage shape and dimensions of the SGI test blocks. Based on the results, the casting designs for the product were studied by the casting analysis using these factors. As a result, the shrinkage prediction accuracy was improved compared to the conventional method, and the casting design was established that does not generate shrinkage cavities in the casting.

Copper Division

Room: A312

Session Chairs:

Gerald Richard
MAGMA Foundry Technologies, Schaumburg, IL

Low-Cost Surface Alloying of Brass to Improve Corrosion Resistance in Chloramine-rich Aqueous Environments (25-181)

Carol Martinez, Swaroop Behera, Kaustubh Rane, Omid Ghaderi, Mehran Zare, Benjamin Church, Pradeep Rohatgi, and Sara Huerta, University of Wisconsin/Milwaukee, Milwaukee, WI; David Palmer, BRP-US, Inc., Sturtevant, WI

A cost-effective method of surface alloying brasses (CuZn40 and Bi-alloy C89836) during sand casting was investigated to improve their corrosion resistance. The process involved coating the mold surfaces with slurries containing suspended metal powders before pouring the melt into the sand molds. This casting process allows the internal and external surfaces of a component to be enriched with selected alloying elements, including nickel, leaving the bulk unmodified. Surface-alloyed castings were made both in a laboratory and an industrial setting. The surface-alloyed castings were analyzed using optical and electron microscopy following the casting process. Distinct surface-alloyed layers of average thickness ranging from 100 to 1000 lm were observed on the surfaces of the castings in contact with the molds treated with the slurry containing metal powders. An SEM-EDS analysis confirmed that the surface-alloyed layer was enriched with nickel, ranging from 21 to 62 wt%. Potentiodynamic testing demonstrated that the cast surface-alloyed samples had a higher corrosion resistance without surface alloying.

Melting Methods & Materials Division

Room: A314

Session Chairs:

John Gatewood
Cadillac Casting, Cadillac, MI

PANEL: Limestone and Dolomite Research on Cupola Slag (25-166)

Travis Hepfner, BCI Solutions, Inc., Bremen, IN; Sean Golden, Textron, Inc., Muskegon, MI; Jake Ross, AMERICAN Cast Iron Pipe Company, Birmingham, AL

A general review on cupola foundries reveals that limestone is used at 60% of the foundries while 40% use dolomite stone for flux in their cupola. The reason on the selection is based on whatever is available on the least cost basis. The geographic location of the supplier to the foundry seems to be the primary reason for the selection. With the encouragement of the Cupola Committee a research team was formed to determine if there are differences in performance of limestone and dolomite on the effect of the cupola slag produced.

Molding Methods & Materials Division

Room: A313

Session Chairs:

Chris Lee
Carpenter Brothers, Inc., Kalamazoo, MI

Jerry Thiel
Precision Casting Technologies, Dysart, IA

The Fluidity and Solidification of Patternless Hollow Aluinosilicate Microsphere Molds Vs. 3D-Printed Silica Sanded (25-083)

Sean Derrick, Western Michigan University, Kalamazoo, MI

It has been shown on multiple occasions that resin-bonded Hollow Aluminosilicate Microspheres (HAM) can be subtractively machined and used as patternless molds comparable to those made from 3D-Printed silica sand. However, these proofs of concepts have shown repeated anecdotal observations that the HAM material has a propensity for prolonged cooling times as well as wetting cavity detail more difficult than that of silica-based systems. With proof of concept established the next step is to quantitively benchmark HAMs cooling and as-cast flow performance to verify the previous observations. To accomplish this, the following study aimed to evaluate the effects of casting fluidity and time to solidify on a known cross-section using a modified non-standard fluidity spiral. As with the previous proofs-of-concept, 3D-printed patternless silica molds were used for comparison.

9:30 – 10:30 a.m.

Casting Designers and Buyers

Casting Source Theater in the AFS HUB - Booth 320

Session Chair:

Ben Yates
American Foundry Society, Schaumburg, IL

Predicting Cast Steel Alloy Properties Based on Composition and Heat Treatment (25-122)

Raymond Monroe, Steel Founders Society of America, Crystal Lake, IL

Steel casting producers make small heats of specialty alloys for custom products. Unlike bulk producers like steel mills, casting producers frequently make non-standard alloys in small quantities, which requires them to be able to formulate heat compositions and heat-treat cycles for non-standard alloys. Non-standard alloys may be required when certain alloying elements are in short supply or unavailable. To develop the methodology for estimating the tensile properties from a non-standard composition a new data base of standard steel cast alloys with composition and tensile properties can be used. This SFSA data set has over 30,000 entries. The data set and an analysis of reported formulas to estimate properties like ideal critical diameter, DI, carbon equivalent, CE, or estimated hardness in heat treatments or welds have been evaluated for their ability to predict properties for non-standard alloy heats.

10:30 – 11:30 a.m.

KEYNOTE

Room: A411-A412

Success is a Journey, Not a Destination (25-168)

Dominque Dawes, 3-Time Olympic Gymnast, Olympic Gold Medalist; First African American Gymnast to Qualify for the Olympic Games

From Olympic Gold Medalist to Broadway, and from television analyst to President of the Women's Sports Foundation, Dominique Dawes continues on a path to inspire, motivate and lead. Dawes is best known for her tremendous success as an Olympic gymnast who competed in three Olympic Games (1992, 1996, and 2000), won four Olympic medals, and has a permanent place in the U.S. Olympic Committee Hall of Fame. Fans across the nation and around the world remember her as a member of the gold-medal-winning "Magnificent Seven" at the 1996 Atlanta Games, where she also won a bronze medal as she wowed the crowd with her stunning performance in the floor exercise, becoming the first female African American gymnast to win an individual medal. She also earned a bronze medal with the U.S. team in the 1992 Barcelona Games and left an imprint in the sports world with her "back-to-back" tumbling pass. Dominique made a surprising comeback with an anticlimactic end in the 2000 Sydney Games. Dawes presentation will focus on empowering audiences to embrace a team mentality, use failure as fuel, and believe in the power of their dreams.

11:45 a.m. – 1:15 p.m.

Room: A404-A405

Copper Luncheon

(Ticketed Event)

The Copper Division Luncheon will feature a speaker of general interest from the Atlanta area and the Copper Division will present their annual awards. The luncheon is open to everyone with an interest in Copper Alloys.

Noon – 12:25 p.m.

Casting Source Theater in the AFS HUB - Booth 320

Sponsored Presentation: The Impact of Air Pollution Control System Design on PM2.5 Emissions

Brandon Billings P.E. BCEE, Nederman MikroPul, Charlotte, NC

Brandon Billings shows you how a well-designed industrial dust collection system can drastically improve capture of PM2.5 particles. This presentation covers key design principles, system efficiency, and best practices for air pollution control to ensure regulatory compliance and environmental sustainability.

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12:30 – 1:30 p.m.

Casting Designers and Buyers

Casting Source Theater in the AFS HUB - Booth 320

Session Chair:

Ben Yates
American Foundry Society, Schaumburg, IL

10 Ways to Reduce Cost on Your Casting Program (25-195)

Tom Kayser, Osco Industries, Portsmouth, OH

Take this list of ideas back to your company and apply them immediately. Metalcasting pro Tom Kayser from OSCO Industries explains these tips and how implementing even a few can be a game-changer.

1:30 – 2:45 p.m.

Casting Source Theater in the AFS HUB - Booth 320

IJMC Student Research Competition

The IJMC/FEF Student Research Competition empowers undergraduate college students to showcase their metalcasting research projects at CastExpo. Winners will earn scholarships and be published in the International Journal of Metalcasting!

1:30 – 3 p.m.

Engineering & Smart Manufacturing Division

Room: A311

Session Chair:

Zach Meadows
Electric Controls & Systems, Birmingham, AL

Journeying Through AI: Real-time Discoveries in Data Analytics with Industry 4.0 (25-086)

Susan Bear, Grede Castings, Southfield, MI; Derek Yesmunt, Norican Group, LaGrange, GA

The presentation on Foundry Artificial Intelligence (AI) offers an in-depth exploration of a foundry industry leader, Grede, and their journey in adopting Industry 4.0 solutions across nine of their North American foundries. It underscores the challenges of managing up to 2,700 variables in a green sand foundry, highlighting how traditional spreadsheet methods fall short. With AI, we'll provide proof that past variables (a collection of over 30 years) can be better understood and controlled when digitizing that industry knowledge into actionable processes. This empowers both new and seasoned professionals with the precise knowledge needed to manage these processes effectively. Hence, combatting some of the industry challenges of labor shortages and upskilling employees.

1:30 – 3:30 p.m.

The AFS Institute

Room: A316

Metalcasting Process Basics-Part Two (25-150)

Patrick Kluesner, Grede Castings, Waterford Township, MI

This course provides a basic overview of the metalcasting process, tracking the path of a casting from quoting through shipping. Common metalcasting terms and highlights from the activities inside the major departments of a metalcasting production facility will be covered. Ideal for those new to the metalcasting industry.

Schedule is subject to change.

3 – 4 p.m.

Room: A411-A412

SFSA Cast In Steel

Cast in Steel 2025 competition challenges university students to use modern casting tools to creatively design and produce a functioning version of a sword for George Washington. Teams are to produce a replica of one of Washington's actual swords or to design one based on his known preferences and needs. One new element for the competition is the plan to document it as a made for TV series to be shown on a major streaming service. The requirements and evaluations will be as in the past, but the performance testing will be done in qualifying rounds to select the finalists for a Grand Finale. Teams will be competing in qualifying round that allows teams from the same schools to be in different rounds. The rounds will be seeded with teams from prior winners. A grand prize and 5 other awards will be presented during the session.

3:15 – 4:45 p.m.

Melting Methods & Materials Division

Room: A314

Session Chair:

Mike Mutton
Larpen Metallurgical Service, Ludington, MI

PANEL: Channel Induction Furnace (25-176)

Best Practices for Inductor Rebuilds
Peter Aruanno, Inductotherm Corp, Sewell, NJ

Melting Out a Slug in a Channel Furnace
Johnny Hill, Martin Foundry, Dallas, TX

Inductor Change and Monitoring Inductor Life
Jordan Coward, AMERICAN Cast Iron Pipe Co., Birmingham, AL

Molding Methods & Materials Division

Room: A313

Session Chair:

Scott Giese
University of Northern Iowa, Cedar Falls, IA

Michelle Ring
Ductile Iron Society, Carmel, IN

Silver Anniversary Lecture: Converting from Shell to PUCB at Toyoda Autoloom Foundry: A Look Back at a Quarter Century of Market Factors that Transformed this Automotive Foundry (25-023)

Kelley Kerns, HA Group, Westmont, IL

Today, Toyota is recognized as one of the largest and foremost innovators in automotive mobility in the world. Toyoda's Autoloom Foundry was no stranger to evolution as it was established in 1926 to manufacture autolooms to weave cloth. For a century, it has continually diversified and transform to meet the demands of industrialization in Japan while out of respect to Toyota's founder Sakichi Toyoda, kept its original name. A quarter century ago, a plan to transform this automotive giant's gray iron engine plant from shell to a modern PUCB key core cellular manufacturing process was set in motion with a focus on a number of unique process innovations. We will look back at how several market conditions effected the Kaisen process and the ultimate adaptive evolution of this automotive casting leader.

PANEL: Foundry Feud (25-064)

Moderators:
Michelle Ring, Ductile Iron Society, Carmel, IN
Jay Morrison, Carpenter Brothers, Inc., Mequon, WI
Liam Miller, American Colloid Co., Hoffman Estates, IL

A follow up to the Jeopardy panel on "What is Green Sand Molding?" a "Foundry Feud" where two groups go on to see how foundries poll on some controversial topics, such as "What causes burn in defects in castings?"

World Foundry Organization (Cast Iron)

Room: A311

Session Chair:

Eric Nelson
Eric Nelson Consulting LLC, Mankato, MN

Lizeth Medina-Balliet
Neenah Foundry, Neenah, WI

Thermal Properties of Ultrafine Spheroidal Graphite Iron Castings (25-025)

Yuuki Kuramato and Yutaka Miyamoto, Ube Steel Co., Yamaguchi, Japan; Haruki Itofuji, I2C Technology Institute, Yamaguchi, Japan

The thermophysical properties in spheroidal graphite iron castings with different nodule size were surveyed after their matrixes were adjusted to ferritic structure. The nodule size in sample castings was changed using sand and permanent molds. Carbon and silicon contents (%) were adjusted from 3.40 to 3.70 and from 1.30 to 3.20 respectively. As the results, smaller nodule size was effective to give higher thermal conductivity for castings when Si content was lower. However, the effects of nodule size disappeared when Si content was higher like over 2.30 %. Thermal conductivity decreased when Si content increased.

Effects of Silicon in High-Cr White Cast Irons (25-147)

Jerrod Miller, Wear-Tek, Spokane, WA; John Tartaglia; Richard B. Gundlach, Element Materials Technology, Wixom, MI

To improve their performance, this research characterized the effects of Si on eutectic saturation, the ideal hardening temperature, hardenability, carbide fraction, and alloying element content in the constituents of high-Cr white cast irons. The influence of Si on % eutectic saturation was not clear. When analyzing carbide fraction, Si had a negligible effect in the 15%Cr series, but seemed to cause the 25%Cr series to develop less eutectic carbide, that is, become more hypoeutectic. Cr was richest in the eutectic carbides and leanest in the eutectic austenite matrix. Si was largely rejected from the eutectic carbides and richest in the eutectic austenite.

3:30 – 4:30 p.m.

Casting Designers and Buyers

Casting Source Theater in the AFS HUB - Booth 320

Session Chair:

Ben Yates
American Foundry Society, Schaumburg, IL

Practical Versus Pretty – What Surface Finish Do You Really Need, and How Do You Get There

TBA

Casting processes, alloys, and post-casting machining can all contribute to giving your casting a pristine surface finish, but not all castings really require aesthetic perfection. Sit and listen in as we talk about how to evaluate and specify surface finish needs for different types of casting components – and when beauty is and isn't worth the expense.

5 – 6:30 p.m.

Room: Registration Hall A

Welcome Reception

(Ticketed Event)

AFS welcomes all attendees to kick off CastExpo 2025 with a reception in the convention center. The reception provides the opportunity to meet with customers, vendors and other attendees. Cocktails and hors d'oeuvres will be served.

6:30 – 8 p.m.

Room: A404-A405

Women in Metalcasting Dinner

(Ticketed Event)

This event is open to AFS members of Women in Metalcasting. It includes dinner, networking, the presentation of the AFS Women in Metalcasting Award of Excellence, and the presentation of Jean Bye AFS Women in Metalcasting Scholarship.

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Sunday, April 13, 2025

7 – 8 a.m.

Room: A302

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 a.m. – 5 p.m.

Georgia World Congress Center Lobby

Registration Open

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7:30 - 10:30 a.m.

Outside Technical and Management Sessions

Coffee Station by AFS Technical and Management Sessions

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MacLean™ POWER SYSTEMS

8 – 9 a.m.

Aluminum & Light Metals Division

Room: A312

Session Chair:

David Weiss
Vision Materials, Manitowoc, WI

Role of Pouring Parameters on Mechanical Properties of Aluminum Alloys (25-069)

Scott Giese and Justine Radunzel, University of Northern Iowa, Cedar Falls, IA; Maria Alverio-Kapka, Carley Foundry Inc., Blaine, MN

Aluminum alloys are notorious in forming an oxide film during gravity filling, potentially becoming incorporated into the molten metal from turbulence. The research objective explored if pouring parameters of temperature and pouring height influence mechanical properties of aluminum alloys because of the oxide film. An experimental design considered these parameters for A356 and A206 alloys. Replicated castings were poured at a foundry using temperatures of 1350oF and 1425oF at pouring heights for 12" and 24", respectively. A linear mixed model technique was used to determine the effect on strength properties and ductility. Pouring temperature was determined to be significant on mechanical properties, though only on certain properties depending on the alloy. Pouring height showed no significance of mechanical properties. Alloy chemistry was postulated to have a contribution on oxide formation with respect to mechanical properties.

The Role of Intermetallic Phases in Hot Tearing of Multicomponent Aluminum Alloys (25-109)

Jianyue Zhang and Alan A. Luo, The Ohio State University, Columbus, OH; Qigui Wang, General Motors, Warren, MI

Hot tearing is a major castability challenge in many multicomponent aluminum alloys especially those with large freeze ranges (solidification intervals). This study used a model alloy Al-15Zn-3Cu (all in weight percentage) with a large solidification interval to investigate the effects of intermetallic phases on its hot tearing tendency during permanent mold casting. Nickel additions of 0.5% to 2% were made to form Al13Ni2 and Al7Cu4Ni phases at high temperatures to affect the solidification behavior of the Al-15Zn-3Cu model alloy. CALPHAD (CALculation of PHAse Diagrams) modeling and casting experiments were performed to understand the solidification behavior and hot tearing mechanisms of these alloys. It was found that the hot tearing tendency can be greatly reduced with minor addition of 0.5% Ni. The role of high temperature intermetallic phases on the hot tearing tendency will be discussed.

Cast Iron Division

Room: A311

Session Chair:

David Gilson
SinterCast, Inc., Pewaukee, WI

Cast Iron Honorary Lecture: A Retrospective Tribute to Rick Gundlach – A Lover of Life, Family, and Research into Cast Metals (25-183)

Kathy Hayrynen, Aalberts Surface Technologies, Livonia, MI; John M. Tartaglia, Element Materials Technology, Wixom, MI

This presentation summarizes how Richard B. Gundlach lived his full personal and professional life. It will review Rick's family life, hobbies, education, employment and the research that he conducted in cast metals. After undergraduate and graduate education at two universities, Rick conducted pioneering research on cast molybdenum steels and cast irons at Climax Molybdenum Company. Subsequently, he co-founded Climax Research Services (CRS), an important engineering and testing company serving the automotive community; CRS is now a division of Element Materials Technology. Throughout his testing, failure analysis, and consulting career, Rick completed research and published numerous papers on the structure-property relationships in gray, ductile and white cast irons for structural and mining applications, much of it funded by AFS. He also helped implement cast aluminum 300 series alloys for car cylinder engines. Rick's two patents in high chromium white irons led to long-term licensing agreements with white iron foundries and utility companies.

Lost Foam Division

Room: A315

Session Chair:

Jacob Belke
Mercury Marine, Fond du Lac, WI

Bio-Based Foam Patterns for Lost Foam Casting (25-020)

Jacob Belke and Adam Kopper, Mercury Marine, Fond du Lac, WI; Tedd Sheets, Betz Industries, Grand Rapids, MI; Saumitra Bhargava, Clarksville, MD; Chris Mercy, LifeMade Products LLC, Belcamp, MD; Dan Mueller, ATLAS Molded Products, Fond du Lac, WI; Jonathan Godfrey, Jadex, Inc., Greer, SC

The lost foam casting process has used expanded polystyrene (EPS) as the pattern material since the inception of the process. EPS is derived from petroleum distillation which carries a heavy carbon footprint and health concerns from the decomposition products during casting. A novel molding bead technology has emerged that derives a polylactic acid (PLA) foam molding bead from sustainable domestic biological sources. Bio-based foam patterns were evaluated for it's potential to replace EPS as a lost foam pattern material using laboratory testing and casting trials. The lab results showed the bio-based materials didn't produce hazardous air pollutants (HAPS) nor carcinogens. The casting trials successfully produced lost foam castings in both aluminum and gray cast iron without any modifications to the lost foam casting process.

Dimensional Data Analysis of Ferrous Lost Foam Castings (25-051)

Mark DeBruin, Skuld LLC, Piqua, OH; Elijah Jones, The University of Toledo, Sylvania, OH

This study reassesses tolerances in traditional lost foam ferrous castings. The tolerances found differ from the 1990s industry standards, tolerances of 0.005 in. (0.127 mm) for the first inch (25.4 mm) and 0.003 in. (0.0762 mm) per inch. Analyzing 1655 measurements from seven companies who were customers of a lost foam foundry in the early 2000s. The team found a consistent linear tolerance of 0.0041 inches per inch (0.0041 mm per mm) across all dimensions. This contradicts previous assumptions about differing linear tolerances for the first inch of castings versus the remainder of the dimensions. Larger parts showed better dimensional control than expected. However, data for parts over 300mm was limited. These results serve as a valuable benchmark of lost foam tolerances in the past. These findings potentially expand the applicability of lost foam casting in manufacturing.

Melting Methods & Materials Division

Room: A314

Session Chair:

John Gatewood
Cadillac Casting, Cadillac, MI

Carbon Footprint Comparison- Electric vs. Cupola Melting (25-143)

David J. Kasun, ATD Engineering & Machine LLC, Au Gres, MI

A comparison is made between typical cupola melting vs. electric melting, for iron, with consideration to total Scope 1 and Scope 2 CO2 emissions for each, taking into account variations in electric grid emission factors per unit electricity. The pros and cons of each process, with some focus on the unique and beneficial recycling capabilities of the cupola are also discussed.

How to Get the Most Out of Your Refractory Castables (25-009)

Griffin Patterson, HWI a Member of Calderys, Pittsburgh, PA

Unlocking the full potential of refractory castables in foundries requires a deep understanding of their engineered properties and optimal usage practices. This work delves into best practices for controlling environmental and process conditions to enhance refractory properties, performance, and lifespan. Topics covered include the impact of ambient temperature control, curing practice, dryout procedures, stainless steel fiber additions, and proper mixing techniques. By sharing practical insights, this work aims to equip foundry professionals with the knowledge to improve the efficiency and durability of their refractory installations significantly.

8 – 9 a.m.

Molding Methods & Materials Division

Room: A313

Session Chairs:

Jeff Krause
HA Group, Westmont, IL

Peter Leblang
Betz Industries, Grand Rapids, MI

Qualifying Sand Blends for Surface Quality in Iron Castings (25-117)

Dr. Sam Ramrattan, Western Michigan University, Kalamazoo, MI; Jay Morrison and Chris Lee, Carpenter Brothers, Inc., Mequon, WI

Chemically bonded sand molding technology remains an important part of metal casting technology because it permits precision sand castings. However, there is a lack of information available on chemically bonded sand blends. This paper relates the physical, mechanical, and thermo-mechanical properties of disc-shaped specimens made from silica sands and silica sand blended with ceramic granular media. American Foundry Society (AFS) standard disc-shaped no-bake core specimens were fabricated. This paper relates the physical and mechanical properties of disc-shaped specimens made from either silica or from silica and ceramic sand blends. Specimens were laboratory tested and evaluate in a gray iron casting trial. Testing included density, impact strength, permeability, abrasion, loss, and scratch hardness. All tests were accomplished according to AFS standards. With a blended sand it was possible to produce cores and molds having superior strength, and physical properties when compared to a round grain silica sand. The chemically bonded round grain silica sand provided a good surface finish but raised surface issues at the specimen/metal interface. Certain sand blends showed fewer casting surface issues but surface finish was not enhanced in the same iron casting trials.

Advancement in Refractory Coatings Technology: Historical Insights and Future Directions (25-134)

Daniel Cygal, HA Group, Westmont, IL

Refractory coatings play a pivotal role in optimizing the surface quality of castings by creating a protective barrier between molten metal and the mold. Historically, the technology behind these coatings has undergone significant advancements, enhancing their ability to reduce thermal shock and mitigate surface defects such as veining, finning, metal penetration, burn-on, scabbing, and erosion. This review delves into the evolution of refractory coatings technology, tracing its development from early applications to contemporary innovations. It will examine how improvements in coating materials and methods have contributed to better casting quality and efficiency and will also consider future trends and emerging technologies that could shape the next generation of refractory coatings.

8 – 10 a.m.

The AFS Institute

Room: A316

Introduction to Quality and Process Improvement - Part One (25-151)

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

Introduction to Quality and Process Improvement is a concise summary of three AFS courses taught by Ted Schorn, one of the leading experts on foundry system quality in the industry. Ted will begin with the role of quality, providing context for the application of process quality control. He will then move though the critical application of problem solving and the use of quality tools before sharing his key enterprise improvement strategies. The two sessions will give an introduction and overview of the NEW QC certificate bundle by AFS and The Institute.

9 a.m. – 5 p.m.

Exhibit Hall A1-3

Exhibits Open

9:15 – 10:15 a.m.

Aluminum & Light Metals Division

Room: A312

Session Chair:

Jacob Belke
Mercury Marine, Fond du Lac, WI

Development of a Self-regulating Permanent Mold Incorporating Phase Change Materials (PCMs) (25-074)

Cheolmin Ahn, Carl Soderhjelm, and Diran Apelian, University of California-Irvine, Irvine, CA

Dynamic casting processes such as permanent mold and die casting require the effective thermal management of molds to balance rapid heat absorption from the molten metal and immediate heat recovery to the mold for subsequent casting cycles. Existing thermal technologies like direct flame and coolants have difficulty controlling heat transfer, resulting in thermomechanical fatigue of the mold due to excessive heating and cooling. Controlling the heat transfer in molds is paramount to ensuring the production of high-quality castings and reducing production cycle times. An innovative approach to controlling thermal gradients in molds involves incorporating phase change materials (PCMs) inside the molds. With their thermal energy storage capability and high latent heat, PCMs embedded in molds facilitate mold temperature self-regulation for heating and cooling as the PCM undergoes solid-liquid phase transformations during the casting process. In this paper, the feasibility and applicability of PCMs in dynamic casting processes will be discussed.

Prediction of Local Tensile Properties in an Aluminum Giga Casting (25-103)

Qigui Wang, Liang Wang, and Jason Coryell, General Motors, Warren, MI

Lightweighting in the automotive industry has driven the emergence of large aluminum castings for body structures, often referred to as “giga castings”. The increasing use of aluminum giga castings in critical structures requires improved quality, with more reliable and quantifiable performance in both safety and durability. Aluminum casting processing is very complex and involves many competing mechanisms, multi-physics phenomena, and potentially large uncertainties. One of the most effective ways to optimize the design and manufacturing processes of aluminum giga castings to achieve the desirable mechanical properties is through the development and exploitation of robust and accurate multi-scale computational material models. This paper reports an integrated computational materials engineering (ICME) approach for through-process modeling of local tensile properties of an aluminum giga casting using GM Virtual Cast Component Development (VCCD) tools.

Engineering & Smart Manufacturing Division

Room: A311

Session Chair:

Jim Wenson
Sinto America, Grand Ledge, MI

The 6C Framework to Build a Connected Factory (25-052)

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

Embracing Industry 4.0 (I4.0) relies on the crucial role of data collection and utilization. The benefits of I4.0 drive operational excellence in connected factories by elevating productivity, uptime, and quality. While the rationale of Industry 4.0 adoption is widely acknowledged, the challenge lies in the practical implementation of a connected factory. The resolution of both technical and human challenges is required for successful adoption. The proposed 6C Framework is structured around six key components to solve these challenges: Criteria, Connect, Communicate, Collect, Consume, and Culture. Understanding this high-level framework is foundational, as it guides countless strategic management decisions when implementing data collection. This framework is deconstructed into tactical aspects to ensure proper technical and cultural questions are considered throughout data collection process. The 6C Framework addresses the human and technical aspects of data collection to aide in implementing I4.0.

9:15 – 10:15 a.m.

Melting Methods & Materials Division

Room: A314

Session Chair:

Lucas Dix
ProFound Alloys, Birmingham, AL

Toward a Quantitative Model of Recarburizer Dissolution for Ferrous Foundries (25-144)

Robert Umpleby, Miller and Company LLC, Rosemont, IL

It is shown that a shrinking particle model can be incorporated into the classic diffusion layer model to generate the dissolution curve for a recarburizer. The method utilizes a transformation of the mass distribution of particle size into a number distribution, thereby allowing the initial surface area of the recarburizer to be estimated. The shrinking particle model then permits the continuously changing particle size distribution to be taken into account explicitly throughout the dissolution process. The applicability of the method is demonstrated for a hypothetical addition of graphite for a ductile iron. The results are consistent with published experimental data for graphitic recarburizers.

Robust Charge-mix Optimization for Cast Iron Foundry (25-070)

Deepak Chowdhary, Anirudh Chowdhary, Rahul V, Abhishankar Kumar, and Nilanjan Banerjee, MPM Infosoft Pvt. Ltd., Nadu, India; Nabil M, Indian Institute of Technology Tirupati, Pradesh, India

Sand compactability is critical in casting, influencing mold quality and defect occurrence in the final cast samples. Maintaining optimal compactability is essential, as deviations can lead to defects like blowholes, scabs, sand inclusion, or sand fusion. This study introduces a machine learning (ML) approach to predict the lab compactability based on the return sand characteristics, environmental conditions, water addition, seasonality, and additives dosage. The predictive model is being utilized to prescribe optimal water addition to achieve desired/optimal compactability. The predictive and prescriptive model utilizes real-time data obtained from IIOT sensors, SCADA/PLC for prescribing batch to batch water addition into the mixer. The proposed algorithm is validated on the foundry data which produced castings for automotive industry having sand to metal ratio varying from 4.6-9.5. Results show a good agreement between the predicted and actual lab compactability with a root mean square error of 0.82%.

Molding Methods & Materials Division

Room: A313

Session Chairs:

Pete Gravunder
Badger Mining Corp., Berlin, WI

Jeff Krause
HA Group, Westmont, IL

Optimizing Clay Addition to Reduce Variability in Green Sand Compactability, Moisture and Strength (25-042)

Paul David Paulsen, Furness-Newburge, Inc., Versailles, KY

Green sand strength is provided by the bonding strength produced by water activation of bentonite clay. Maintaining the proper proportion of clay, moisture, and other green sand components is critical for casting quality and made challenging since material losses during each casting cycle are highly variable. If compactabilities of different samples match, then a comparison of the samples' moisture and strength can reveal green sand composition changes. Control strategies are applied in automated production systems to adjust bond addition to minimize variations in moisture. Application of optical moisture sensor measurement and understanding of the fundamental relationships between clay, moisture, compactability, and strength form the basis of this control strategy. Clay addition optimization resulted in improved compactability control and reduced variability in moisture and strength.

Digital and Agile Moisture, VOC, and LOI Testing Using an Induction Heating Technology (2025-115)

Dr. Sam Ramrattan, Robert Makin, and Zachary Tay, Western Michigan University, Kalamazoo, MI

The foundry industry depends upon measurements of moisture content (MC), volatile organic compounds (VOC), and loss-on-ignition (LOI) testing to manage sand systems. At the AFS Casting Congress 2024 a "Fast MC, VOC, and LOI Test" capable of achieving digital data was revealed. That technology used magnetron (M) and infrared (IR) technologies that is faster than conventional laboratory approaches for running all three tests independently. This study identifies the use of a singular heating technology to achieve rapid MC, VOC, and LOI testing in a single unit. A prototype tester has been developed using induction heating technology capable of completing all three tests in series. The testing technology allows for a short exposure time to heat a foundry sand sample and provides digital data for the three tests. The actual sample test time is comparable to an automated LOI test and is considerably faster than either the muffle furnace or microwave furnace. This study will confirm there is no significant difference between the AFS Standard MC, VOC, and LOI tests and the new induction testing device.

Women in Metalcasting

Room: A315

Session Chair:

Maddie Wilson-Smith
Pittsburgh Foundry & Machine, Pittsburgh, PA

Empowering Women and Cultivating Inclusive Leadership in Metalcasting (25-178)

Lisa Ryan, CSP, Founder and Chief Appreciation Strategist, Grategy, North Royalton, OH

The metal casting industry faces unique challenges, from addressing workforce diversity to meeting the evolving demands of a dynamic marketplace. Building a workplace culture that empowers women, fosters inclusivity, and develops strong leaders is essential for advancing the industry and ensuring long-term success. This program will provide actionable strategies to help women in metal casting thrive in their careers while supporting organizations in cultivating a culture of leadership and inclusion. By focusing on professional development, work-life integration, and practical solutions, attendees will gain the tools to create meaningful change both personally and professionally.

Thanks to our Sponsors:

Schedule is subject to change.

9:30 – 10:30 a.m.

Casting Designers and Buyers

Casting Source Theater in the AFS HUB - Booth 320

Session Chair:

Ben Yates
American Foundry Society, Schaumburg, IL

The Investment Casting Conversion Process: An Industry Consensus (25-187)

Vasko Popovski, Ransom & Randolph, Maumee, OH

Newcomers to the investment casting market, specifically buyers and designers, face challenges in navigating a new territory of terminology, value elements, and market forces. The purchasing and design methods that have worked previously might suddenly have unexpected shortcomings. Also, it can be difficult to make decisions when your contact with the industry is limited, and a small error can result in a project being stalled or never realizing its full potential. This paper aims to convey practical information about the procurement and design of investment castings by demonstrating quantitatively the consensus among industry veterans about these topics.

10:30 – 11:30 a.m.

KEYNOTE

Room: A411-A412

Principles for Leading High-Performance Teams (25-169)

Scott Moore, Expert on Building and Leading "No-Fail" Teams and United States Navy SEAL Rear Admiral (ret.)

Having served 30 years as a SEAL leader, retired Rear Admiral Scott Moore is a master in organizational leadership and teambuilding. He served in every leadership position in the SEAL teams, including the former commander of the Naval Special Warfare Development Group, and closed out his career as the number two leader in the entire SEAL organization. He led the military's elite forces through more than 2,000 of our nation's most extreme, high-stakes missions and was deployed on SEAL team operations across the globe. He understands the importance of leadership and cohesiveness like few others can, and his experience runs the gamut from leading small groups to large-scale tactical planning. From the mountains of Afghanistan to briefings in the Oval Office, Moore is the man our leaders trusted when failure was not an option. Moore will share stories of teamwork in life-and-death circumstances and insights on recruiting, training, and equipping teams that exceed expectations.

11:45 a.m. – 1:15 p.m.

Room: A404-A405

Volunteer Leadership Awards Luncheon

(Ticketed event)

Join us for a fun, fast-paced awards luncheon. 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 including the presentation of the Scientific Merit and Service Citation awards.

Noon – 12:25 p.m.

Casting Source Theater in the AFS HUB - Booth 320

Sponsored Presentation: Lake Sand - Chemistry, Quality and Consistency for Improved Casting Processes

Dorothy Havlin, The Nugent Sand Company, Muskegon, MI

Lake sand is a complex, sophisticated mixture of naturally occurring minerals that provide advantages in mold and core making processes. Strict adherence to processing, quality control and consistency in supply result in casting defect reductions and net cost savings.

NUGENT SAND

12:30 – 1:30 p.m.

Casting Designers and Buyers

Casting Source Theater in the AFS HUB - Booth 320

Session Chair:

Ben Yates
American Foundry Society, Schaumburg, IL

Get the Best Casting! A Foundry-End User Panel Discussion

TBA

Casting Source magazine's editor moderates a lively conversation featuring examples of true innovation, problem-solving, and collaboration resulting in castings that exceeded expectations.

1:30 – 2 p.m.

Casting Designers and Buyers

Casting Source Theater in the AFS HUB - Booth 320

Session Chair:

Ben Yates
American Foundry Society, Schaumburg, IL

2024 Casting of the Year Case Study

TBA

Members from the foundry engineering team at St. Marys Foundry pull back the curtain on how they produced a 6,600-lb. frame for a hard-working frac pump that put their casting and coremaking skills to the test. Hear the specs, the challenges, and the solutions they achieved through collaboration with their oil-and-gas industry customer.

1:30 – 3 p.m.

Aluminum & Light Metals Division

Room: A312

Session Chair:

Carlos Esparza
LeSueur Incorporated, Le Sueur, MN

Silver Anniversary Lecture: A Review Article on Effect of Mg and Trace Elements on the Solidification and Dissolution of Al2Cu Phase in 319-type Alloys (25-148)

Herbert Doty, General Motors, Warren, MI; Ehab Samuel, National Research Council of Canada, Quebec, Canada; Mohamed Abdelaziz, PhD, Universite Francise d'Egypte, Cairo, Egypt; Hany Ammar; Fawzy H. Samuel; Agnes Samuel, Universite du Quebec a Chicoutimi, Quebec, Canada

The review summaries the main findings on 319.1 aluminum alloy obtained by the present authors over a period of 10 years. The increased number of modified silicon particles serve as nucleation sites for precipitation of very fine individual Al2Cu particles. Grain refining plays an important role in reducing the degree of the Al2Cu segregation. Increasing the magnesium content results in the transformation of some of the Al5FeSi into Al8Mg3FeSi6, as well as precipitation of Al5Mg8Cu2Si6 in the form of branched crystals or ultra-fine eutectic, growing out of Al2Cu particles during the final solidification of the complex eutectic reaction that takes place in the final stages of solidification. Increasing the Mg content gradually reduces the temperature of the incipient melting. The presence of traces of Fe and Ni in the base alloy and their interactions with the Mg and Cu forming insoluble compounds lead to increasing the temperature of incipient melting.

Effect of Section Size and Cooling Rate Variation in the Microstructure of Al-Ce-Ni-Graphite Composites (25-102)

Kaustubh Rane, Swaroop Behera, Mehran Zare, Alec Buhler, Luke Wilson, Benjamin Church, and Pradeep Rohatgi, University of Wisconsin-Milwaukee, Milwaukee, WI; David Weiss, Vision Materials, Manitowoc, WI

The effect of cooling rate variation on the microstructure and properties of Al-12Ce-2.5Mg alloy reinforced with Ni-Graphite has been presented in this study. The composite melt prepared by stir mixing was cast in a preheated permanent step mold wherein the section size varied from 3.7 mm to 30 mm. The distribution of graphite, primary and eutectic phases, hardness, and density have been studied as a function of section size and cooling rate. The volume percentages of intermetallic phases changed with an increase in section size, and the hardness decreased with an increase in section size, suggesting that other mechanical properties are a function of section size and cooling rate. The results were compared with those of the Al-12Ce-2.5Mg base alloy cast using the same process to understand the effects of Ni-Graphite additions on the microstructure and properties of Al-12Ce-2.5Mg alloy in different sizes.

Cast Iron Division

Room: A311

Session Chair:

Brad Steinkamp
Charter Dura-Bar, Crystal Lake, IL

Brandon Reneau
Caterpillar, Inc. Dunfermline, IL

Effect of Ceramic Aggregate on Cast Iron Mechanical Properties (25-067)

Scott Giese and Justine Radunzel, University of Northern Iowa, Cedar Falls, IA

Because of the recently passed OSHA Silica Rule , many iron foundries have or are considering changing from silica sand to a ceramic aggregate to alleviate the issue. The AFS Cast Iron Division initiated a research project to understand the impact of the change in the microstructure and associated mechanical properties on cast iron that might accompany the use of these ceramic molding media. Funded by AFS, a research project was performed to assess the mechanical properties of class 40 gray iron and 80-55-06 ductile iron castings using an experimental casting matrix of the three aggregates with two sand to metal ratios. Results indicated that ceramic aggregates have a noticeable influence on mechanical properties of gray and ductile iron but sand to metal ratio has an influence on the degree of properties variation.

Understanding the Effects of Boron on the Microstructure and Mechanical Properties of Pearlitic Ductile Iron (25-089)

Colleen Lehrer, Laura Bartlett, and Simon Lekakh, Missouri University of Science & Technology, Rolla, MO

Trace quantities of boron affect the microstructure and mechanical properties of spheroidal graphite irons (SGI). To quantify these effects, a pearlitic SGI with controlled boron residuals from 12 to 96 ppm was cast into no-bake silica molds featuring step blocks with 5, 15, 30, and 50 mm thicknesses, chill wedges, and integrated thermal analysis cups. Tensile properties were determined via modified Keel blocks. Solidification simulations predicted cooling rates of resulting castings. Boron additions up to 39 ppm decreased the tensile and yield strengths of the alloy, as well as reduced the pearlite fraction and hardness for all section thicknesses. Additions up to 39 ppm decreased the temperature at the end of solidification and raised eutectoid temperatures of interest. The interacting effects of boron and cooling rate were prominent in the 5 mm section, displaying increased ferrite content, nodule number density, and decreased nodularity at all levels of boron.

A Novel Technique for Improved Measurement of Graphite and Inclusions in Ductile Iron Contaminated by Boron (25-079)

Chase Schroeder, Laura Bartlett, Simon Lekakh, and Colleen Lehrer, Missouri University of Science & Technology, Rolla, MO

The highly heterogeneous microstructure of ductile iron in casting includes graphite particles, non-metallic inclusions, microporosity, and other features, such as carbides distributed in the ferrite/pearlite matrix. Determination and comprehensive quantification are both practically important and extremely challenging. The microstructure of ductile irons with different boron concentrations in section sizes from 5 to 50 mm were used for comparative studies. An advanced methodology based on an automated SEM/EDX analysis was developed and compared to the standard optical imaging method. In addition to back scattered electron contrast, sensitive to atomic number, a novel methodology added EDX data to identify and classify the multiple structural features at micron resolution thresholding. To quantify the shape of individual graphite particles, several algorithms including ferret diameter, actual, and eight-based chord raster perimeters were compared. The advantages of this novel methodology were statistically proven.

Engineering & Smart Manufacturing Division

Room: A314

Session Chair:

Francois Audet
Foundry Solutions Metallurgical Services, Quebec, Canda

Building Resiliency in the Casting Industry Using Composite, Industry-wide 4.0 Assessment Lessons Learned and Best Practices (25-017)

Todd Hutcheson, University of Northern Iowa, Cedar Falls, IA

Domestic foundries are challenged to improve their bottom line to ensure an ability to meet baseline/surge demand for cast parts. Accelerated integration of new technologies like integrated sensors, autonomous robots, additive manufacturing, augmented reality, simulation/digital twin models and large real-time dataset analysis is allowing casting companies to continue to meet demand. Consolidating industry-wide data gathered during DLA project outreach activities has provided information on condition of Industry 4.0 technology best practices/lessons learned implementation. Value is obtained by applying these lessons learned in each business, and additional value is gained by viewing the industry as a whole in driving focus towards improving supply chain availability and agility.

1:30 – 3 p.m.

Engineering & Smart Manufacturing Division

Room: A314

Session Chair:

Francois Audet
Foundry Solutions Metallurgical Services, Quebec, Canda

AI-Driven Casting Simulation for Faster Design Developments (25-065)

Milan Raval, Altair Engineering, Troy, MI

Casting Simulation is the most amazing innovation for casting experts. When it was introduced in the early '70s, industry people felt relief as they were facing challenges like cost, trial and error methodology, and time consumption. Simulation technology solved most of these problems, but additional challenges arose. Challenges like performing multiple casting simulations by design engineers for decision-making, and simulations that can take days to run on large models like Megacasting. In both cases computational time became a bigger challenge. The way the traditional trial and error method was replaced by casting simulation, here we will be talking about leveling up with the fundamentals of AI. Casting simulations that could take days to compute, AI integration can predict in seconds or minutes.

Lost Foam Division

Room: A315

Session Chair:

Mark DeBruin
Skuld LLC, Piqua, OH

Preliminary Roughness and Dimensional Control Data for Additive Manufacturing Evaporative Casting Process (25-054)

Sarah Jordan and Mark DeBruin, Skuld LLC, Piqua, OH

Additive Manufacturing Evaporative Casting (AMEC) is a new patent pending process that merges polymer extrusion 3D printing with lost foam investment casting. The key question for designers to use any novel manufacturing process is what is the resulting geometric output. This study beings to address those questions for AMEC by looking at the dimension and surface metrology data from AMEC A356 aluminum coupons. Thus far the data indicates that AMEC has worse dimensional control than standard lost foam but superior to sand casting. The resulting surface roughness of the casting is highly dependent on the 3D print's starting surface. Typical roughness is higher than lost foam and traditional sand casting but superior to typical sand printing.

Optimizing 3D Printable Filaments for Printed Expendable Patterns in Lost Foam Casting (25-045)

Jacob Belke and Sean Frank, Mercury Marine, Fond du Lac, WI

The lost foam casting process offers significant advantages, including the elimination of parting lines and cores, leading to reduced machining and material waste. However, the traditional method of creating foam patterns involves expensive and time-consuming tooling, which limits the process's flexibility and cost-effectiveness, particularly for low-volume production and rapid prototyping. 3D printing emerges as a transformative solution to these challenges, allowing for the direct fabrication of complex lost foam patterns without the need for traditional tooling. Despite these advancements, a significant knowledge gap remains in the selection of appropriate materials for 3D printed patterns. Sixteen 3D printable materials were assessed for use as expendable printed patterns using thermogravimetric analysis (TGA) and casting trials. Variants of polyethylene performed the best in TGA and casting trials, but face printing challenges. High impact polystyrene (HIPS) was designated the best overall and shown to be improved further with plasticizers and foaming agents.

Molding Methods & Materials Division

Room: A313

Session Chairs:

Liam Miller
American Colloid Co., Hoffman Estates, IL

Sairam Ravi
Atek Metal Technologies, New Hampton, IA

Time Evolution of Hot Permeability and its Relation to Darcy's Number in Foundry Sand Systems (24-114)

Dr. Sam Ramrattan, Robert Makin, and Zachary Tay, Western Michigan University, Kalamazoo, MI

A hot permeability test was designed to provide time series data to examine venting characteristics in foundry sands at an elevated temperature. This was achieved by modifying the standard AFS Mold Quality Indicator (MQI) permeability tester and applying induction technology to create a hot surface tip which is constantly in contact with the sand specimen. This technique can be used for both green and chemically bonded sand specimens. The focus of this study was to investigate any potential deviations in permeability number of foundry sand specimens at ambient and elevated temperatures to form a correlation within the mold-metal interface and venting characteristics in foundry sand. For each sand system in this study, the time evolution of the permeability number was measured from ambient to 500 °C. From this time series data, the rate of change, and change in permeability number was captured by calculating a permeability index. Furthermore, Darcy's number was calculated using the permeability number and characteristic length of the sand system. This results from these test show that as the green sand moisture (compactability) condensation layer is driven back in the specimen due to heat transfer, the permeability number changes and the rate of change can be determined. Correspondingly, hot permeability rates of change are shown among various chemically bonded sand binder specimens at various binder level. The finding of this study offers an enhanced understanding of the gas flow venting in foundry sand systems. The measured time series data at elevated temperature can provide beneficial boundary conditions to casting solidification simulation.

Thermo-mechanical Properties of Shell Resin Coated Sands to Identify Cure Parameters (24-116)

Dr. Sam Ramrattan, Robert Makin, and Zachary Tay, Western Michigan University, Kalamazoo, MI

Shell molding technology remains an important part of metal casting technology because it permits precision sand castings. As the ever-growing need to produce complex castings increases, so does the complexity of cores and molds. In order to accomplish near-net-shape casting with minimal defects, it is necessary to understand the thermal-mechanical effect suffered by the cured cores and molds at the superheat temperature for an alloy. Aeration filling using free flowing resin coated shell sand offers a superior means to fill a core box. Aeration technology makes it possible to sand fill complex shapes, deep pockets, and thin sections in tooling that heretofore were not possible by conventional gravity or high-pressure blow. However, a conundrum remains in determination of the optimal shell cure temperature. The foundry industry has generally used a visual criterion based on a cure color chart. This study points out the issues caused when using a subjective methodology. This research study examines the effects of tight thermal curing parameters on both silica and ceramic shell sand systems. Laboratory testing equipment was utilized as opposed to the more laborious foundry casting trials. Productivity and quality issues such as shakeout and dimensional accuracy was used to determine optimal cure. Aeration filled shell disc-shaped core specimens were fabricated and testing included scratch hardness, retained strength, and thermal distortion. With a shell aeration sand filling system, it is possible to produce cores and molds having superior abrasion resistance, strength, and thermal stability especially with a ceramic sand.

1:30 – 4:30 p.m.

The AFS Institute

Room: A316

Introduction to Quality and Process Improvement- Part Two (25-152)

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

Introduction to Quality and Process Improvement is a concise summary of three AFS courses taught by Ted Schorn, one of the leading experts on foundry system quality in the industry. Ted will begin with the role of quality, providing context for the application of process quality control. He will then move though the critical application of problem solving and the use of quality tools before sharing his key enterprise improvement strategies. The two sessions will give an introduction and overview of the NEW QC certificate bundle by AFS and The Institute.

2:15 – 3:15 p.m.

Casting Designers and Buyers

Casting Source Theater in the AFS HUB - Booth 320

Session Chair:

Ben Yates
American Foundry Society, Schaumburg, IL

Update on AFS Project for Digitizing Various Knowledge Platforms (25-010)

Brian Began, American Foundry Society, Inc., Schaumburg, IL

This presentation will focus on AFS's efforts to improve digital accessibility and operability of its various knowledge platforms. This digitization entails improving navigation and functionality/searchability between various platforms including the digital library, AFS Onlive webinars, a new, yet-to-be-developed digital publication platform, CADS (Casting Alloy Database Search), and others. These efforts will also make AFS platforms more mobile-friendly and include creating new reference instructional/educational videos. Ultimately, it will highlight the various exciting ambitions with projected timelines and the status of the ongoing AMC Emergent Metal Casting Solutions (EMCS) project, funded by the Defense Logistics Agency (DLA) and AFS under the project title "Virtual Knowledge Transfer Platforms for Improved Access to Metalcasting Best Practices".

3:15 – 4:45 p.m.

Additive Manufacturing Division

Room: A313

Session Chairs:

Jerry Thiel
Precision Casting Technologies, Dysart, IA

Dave Rittmeyer
Matthews Additive Technologies, Pittsburgh, PA

Advanced AM & 3D Printed Sand Mold Technologies to Support Casting Supply (25-034)

Greg Colvin, Honeywell Aerospace, Phoenix, AZ

US casting supply has limited responsiveness for many high integrity hardware especially for sporadic low quantity demand military applications. Additive Manufacturing provides an opportunity to augment the casting supply chain by filling gaps in supplier readiness. This presentation will discuss new advanced AM technologies that can be leveraged by the casting supply chain to improve their responsiveness to new casting orders especially those of low demand high integrity hardware. Technologies discussed will include improvements to 3D printed sand mold production methods for producing sand castings. These will include improving sand mold surface roughness, reducing outgassing from 3D printed sand mold during casting and methods to reduce dimensional variation between repetitive mold builds. AM technologies available to build rapid tooling including machining fixtures and inspection tooling will be discussed. Advanced AM high strength metallic and polymeric systems will be presented that can be leveraged for tooling and other applications. In summary, this session will help the casting industry practitioner review and possibly leverage Additive Manufacturing technologies to support their particular casting processes and applications.

Printed Sand Equipment Options and New Innovations (25-131)

Greg Colvin, Honeywell Aerospace, Phoenix, AZ

US casting supply has limited responsiveness for many high integrity hardware especially for sporadic low quantity demand military applications. 3D Printed Sand provides an opportunity to augment the casting supply chain by filling gaps in supplier readiness and producing mold sections with greater geometric complexity relative to traditional sand mold production methods. This presentation will discuss current printed sand equipment available to US foundries versus new equipment that has recently become available for printing sand cores and mold sections. The presentation will discussed what is required to satisfy Honeywell sand casting requirements for will be discussed relative to the different printed sand equipment casting quality results. The different equipment types offer options in printed sand binder compositions, differences in surface finish of printed sand and variation in ease of sand removal post-casting. It is important for the foundry professional to understand the different equipment performance outcomes to optimize the characteristics of the printed sand core/mold sections relative to the casting and customer requirements. In summary, this session will help the casting industry practitioner improve their leverage of printed sand technologies to support their casting processes and applications.

Printed Sand Best Practices Driven Research using AFS Test Casting (25-141)

Jiten Shah, Product Development & Analysis LLC, Naperville, IL; Greg Colvin, Honeywell Aerospace, Phoenix, AZ

The results from America Makes / AFRL funded and Honeywell led research focused on making improvements in the complex aluminum sand castings surface finish and dimensional tolerances using 3D printed cores and molds, with reduction in out-gassing will be presented using the best practice driven data generated with the AFS Test Casting poured at Denison Industries and other military castings poured at Ohio Aluminum and Chicago Magnesium foundries. This is a two year research project and results till-date will be presented. The knowledge generated will be incorporated into the future AFS courses and training courses including revised pocket book on 3D printed sand.

Cast Iron Division

Room: A311

Session Chair:

Kramer Pursell
Metal Technologies Auburn Castings, Columbia City, IN

Mike Riabov
Elkem Silicon Products, Appleton, WI

Effects of In-Mold Additions of Al, Ca, Ce, Sr, or Ti on Austenite Grain Morphology and Eutectic Cell Size of a Hypoeutectic Gray Cast Iron (25-055)

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

This work is a study of the effects that different in-mold additions have on the morphology of austenite and the eutectic cell structure in grey iron. The experiment utilizes a novel heat-treatment process that revealed the grain boundaries of austenite at room temperature in low-alloy cast iron. The in-mold additions studied were Al, Ca, Ce (mischmetal), Sr, and Ti. Each was poured during the same heat of a hypoeutectic grey iron with a high-purity silicon in-ladle addition. The austenite grain boundaries and the eutectic cell structure were revealed successfully. The results indicated that the Al addition sample had the least refined structure of austenite, and the Sr sample has the most refined austenite. Additionally, there is evidence to suggest a correlation between a larger equiaxed zone size and larger eutectic cells in the equiaxed zone.

Machinability of Solution Strengthened Ferritic Ductile Iron (25-145)

David Labyak, Michigan Tech University, Houghton, MI

Solution strengthened ferritic ductile iron is a grade of ductile iron where the ferritic matrix is solution strengthened by silicon. The addition of silicon results in a combination of higher mechanical properties and higher elongations as compared to standard grades of ferritic ductile iron. Some research suggests silicon solution strengthened ferritic ductile iron (SSFDI) grades can result in a 10-50% machining cost savings compared to conventional grades. Although these grades can result in lower machining costs, some grades have an increased base cost in the raw material form. For example, 500-14 SSFDI and 600-10 SSFDI ductile iron grades can be 1% to 4% higher in base casting costs over comparable conventional grades. With the lack of machining knowledge has impeded the growth of 500-14 SSFDI and 600-10 SSFDI in North American markets, due to machining costs being kept at conventional grade speeds and feeds.

3:15 – 4:45 p.m.

Cast Iron Division

Room: A311

Session Chair:

Kramer Pursell
Metal Technologies Auburn Castings, Columbia City, IN

Mike Riabov
Elkem Silicon Products, Appleton, WI

Some Factors Affecting the Hot Workability of Ductile Iron (25-099)

David Sponseller, OMNI Metals Laboratory, Inc., Ann Arbor, MI

The hot workability of ductile Iron has been studied in the range 2.08 - 4.36 pct C, using 10-lb ingots. The highest workability was observed at low carbon levels. In a preliminary experiment, an ingot containing 3.24 pct C was successfully rolled at 1850 F to 3/64 inch strip. Other ingots containing approximately 2.25 pct C developed no cracks when rolled without reheats from 1900 F to just below 1500 F. Hypereutectic ingots cracked extensively during rolling. Workability was considerably better at 1950 F than at 1850 F, and with lighter reductions (3-5 pct per pass) than with heavier (10-15 pct per pass). Variations in Si concentration from 0.63 to 1.45 pct did not significantly affect workability. Hot workability correlated rather well with ductility in hot tensile tests at the working temperature, a hot elongation of 50% minimum indicating good workability at that temperature.

Steel Division

Room: A312

Session Chairs:

Koushik Balasubramanian
Missouri University of Science & Technology, Rolla, MO

Maximizing Casting Yield for Common Industry Steels by Comparing Outcomes of Experiments that Vary Riser Size, Shape, Material, Sleeve Thickness and Breaker Core Aperture (25-011)

Joshua Gammariello, Foseco, Chattanooga, TN

Maximizing casting yield is essential for a steel foundry's economic performance. In this paper, the authors will walk through a design of experiments via simulation and real-world testing which provides information that helps steel foundries make complex risering decisions. It will evaluate how variables such as sleeve material type, sleeve wall thickness, breaker core opening, riser diameter, riser height, and riser shape affect yield, casting porosity, and riser safety margin. Based on the conclusions found in this paper, foundries may be able to increase the yield of their casting by refining their sleeve utilization practice, resulting in equally performing risers with smaller diameters, shorter heights, or a combination of both.

Convective Current Manipulation in Steel Castings (25-050)

Mark Thompson and Soren Andersen, MAGMA Foundry Technologies, Inc., Schaumburg, IL

Two common defects in steel foundries are shrinkage and macro-segregation. Depending on the alloy, the effects of macro segregation may be critical to mechanical properties and composition requirements. Both macro segregation and shrinkage indications can be affected by convective currents in large steel castings. These currents can be accurately simulated to understand the impact metal flows during solidification have on casting quality. In this study, convection and its effects on shrinkage indications and macro-segregation in large steel castings will be investigated. A large steel casting will be reviewed and simulated using advanced casting process simulation software. This process will allow for physical casting properties to be cross analyzed with simulation results. Design alterations of risers, chills, and the casting will be implemented to allow for castings with larger section sizes and create a more constant element dispersion through the solidified part.

World Foundry Organization (Aluminum)

Room: A315

Session Chairs:

Carl Soderhjelm
Advanced Casting Research Center, Irvine, CA

Secondary Phase Increases the Elastic Modulus of a Cast Aluminum-Cerium Alloy (25-179)

David Weiss, Vision Materials, Manitowoc, WI

Alloying in metal castings is one of the principal methods of strengthening an alloy for various structural and functional applications, but very rarely does it modify an alloy's elastic modulus. We report a methodology of combining alloying elements to form a multi-component, high symmetry, rhombicuboctahedron (RCO) phase that was discovered to enhance the elastic modulus of a cast aluminum alloy to 91.5 ± 7.4 GPa. Flux grown single crystals of the RCO phase were used to enhance understanding of the structure and mechanical properties of the phase. The pure RCO phase's structure and site occupancies were co-refined using x-ray and neutron diffraction. Dynamic nanomechanical testing of the cast alloy shows the primary RCO phase has a high, relatively isotropic, elastic modulus. This RCO containing aluminum alloy is found to have a specific modulus that exceeds that of the leading Al, Mg, Steel, and Ti alloys. For casting designs that are stiffness driven, this alloy has important implications for cast lightweight products.

Temperature Losses in Cups of Tilt-Poured Permanent Molds (25-016)

David Levasseur, Gheorge Marin, and Franco Chiesa, Centre de Metallurgie du Quebec, Quebec, Canada

Tilt-poured permanent mold casting is a process where a cast-iron or steel mold is filled by tilting it from the horizontal to the vertical position to reduce the turbulence which takes place when the mold is "gravity filled" in a vertical position. The liquid aluminum is first poured into a cup that will deliver the liquid metal to the mold as the cup-mold assembly is tilted; normally, the cup is generally emptied when a tilt angle of 45 degrees is reached; the mold continues its motion until it reaches the vertical position which is kept until the casting and the gating are fully solidified. The temperature of the metal poured into the mold is less than that of the metal poured in the cup by an amount that we shall call the temperature loss in the cup. This loss depends on factors such as the amount of metal poured, the tilt speed and the number of cycles per hour. It is rarely considered when modeling the thermal history of the process, if not by at times, by subtracting several degrees to the temperature of the metal poured into the cup. The purpose of this paper is to evaluate these temperature losses via thermal modeling; the accuracy of these predictions will be tested on 2 castings involving widely different conditions in terms of amount of metal poured, filling time and number of castings poured per hour.

How to use Alloy Variations to Enhance Mechanical Performance (25-180)

David Weiss, Vision Materials, Manitowoc, WI

The aluminum casting industry has done a lot of work to improve the quality of molten metal alloys, such as proper de-gassing and cleaning, grain refinement and modification. The mechanical properties of properly prepared materials are expected to meet standards when cast within the allowable chemical compositions of the alloys. If the customer is asking for more, or if section size differences and other factors make it difficult to achieve those properties, the chemical composition range can be used to optimize properties. This presentation will discuss maximizing properties in three commonly used aluminum alloys, A356, E357 and A206 through heat treatment and adjustments to alloy chemistry within the allowable chemistry ranges of those alloys.

Schedule is subject to change.

6 – 7 p.m.

Omni Atlanta Hotel at Centennial Park - North Tower - International Ballroom Lobby

Annual Banquet Reception
(Cashless Bar)

Join us for a memorable evening with friends new and old. The cashless bar opens at 6 p.m.

7 – 9 p.m.

Omni Atlanta Hotel at Centennial Park - North Tower - International Ballroom

Annual Banquet
(Ticketed event)

Join us for business networking and the presentation of the highest AFS honor, the Gold Medal and the WFO Jozef Suchy Award. 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 – 10 p.m.

Omni Atlanta Hotel at Centennial Park - North Tower - International Ballroom Lobby

President's After-Party
(Cashless Bar)

Network with your industry peers at this fun capstone to the evening.

Monday, April 14, 2025

7 – 8 a.m.

Room: A302

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 a.m. – 5 p.m.

Georgia World Congress Center Lobby

Registration Open

Attendee bags sponsored by:

Humtown
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Lanyards sponsored by:

sinto

7:30 - 10:30 a.m.

Outside Technical and Management Sessions

Coffee Station by AFS Technical and Management Sessions

Coffee Sponsored By:

FORTE TOOLING TECHNOLOGIES
PATTERNS - MOLDS - CORE BOXES

MacLean™ POWER SYSTEMS

8 – 9 a.m.

Additive Manufacturing Division

Room: A313

Session Chair:

Jerry Thiel
Precision Casting Technologies, Dysart, IA

Dave Rittmeyer
Matthews Additive Technologies, Pittsburgh, PA

3D Printed Pattern Wear High Pressure Green Sand (25-032)

Marshall Miller, 3D Systems, Rock Spring, GA

Although the AFS Library contains at least 10 papers on the wear rates and the application of various pattern materials, only 2 are available that apply to extrusion additive manufacturing and the various materials used or available to use for the application. Most of the outcome of the wear studies are based on the rate of loss of material by weight or simple dimensions and not geometric changes to complex shapes. And, studies reviewed have the testing performed in a laboratory setting on test components, not actual patterns. While laboratory studies are useful, they do not reflect the actual effect different molding processes such as high pressure vertical and cope and drag molding, sand types (angular, sub-angular, round), binders, squeeze/blow pressures and other parameters only experienced in the true foundry molding environment. This presentation will show the wear rate of various materials based on cycle count and geometric measurement over time.

Enhancing Efficiency and Quality in Investment Casting with Additively Manufactured Ceramic Shells (25-094)

Jason Walker and Michael Enciso, The Ohio State University, Columbus, OH

This paper describes improvements aimed at enhancing manufacturing efficiency and casting quality for investment castings using additively manufactured (AM) ceramic shells. These shells, created through a resin-based AM process, incorporate specific design modifications that simplify mold assembly and improve geometric fit. Additionally, new inspection methods were developed to ensure the shells meet specifications before the pouring stage, helping to identify defects earlier in the manufacturing process and thereby reducing costs and waste. By validating shells prior to pouring, the process minimizes unnecessary expenses and material loss. The findings from this work provide valuable insights into the unique considerations of using AM in the foundry industry. This research contributes to better understanding the challenges and benefits of integrating AM technologies in traditional manufacturing processes, highlighting how continuous process refinement can lead to more efficient, reliable, and cost-effective production outcomes in the foundry sector.

Cast Iron Division

Room: A311

Session Chair:

Angella Sell
Aalberts Surface Technologies, Livonia, MI

Lizeth Medina-Balliet
Neenah Foundry, Neenah, WI

Characteristics of "Monday Morning" Base Iron (25-113)

Cathrine Hartung, Leander Michels, and Mike Riabov, Elkem Silicon Products; Robert Schmidt, Grede St. Cloud

The term "Monday morning" iron refers to metal that has been held in a furnace over an extended period, typically over a weekend. A key characteristic of these irons is poor potential for graphite nucleation, combined with a high amount of undercooled graphite. Foundries face a labor-intensive process to enhance the quality of this metal before casting. The undesirable microstructure is commonly attributed to the loss of carbon. In this context, the current study examines the role of microinclusions in Monday morning irons under three conditions: after a prolonged holding time, following addition of new carbon, and when the metal is ready for production use. The findings reveal that the poor nucleation condition is not due to carbon loss, but rather to a lower number density and change in morphology of microinclusions, especially sulfides.

Cast Iron Division

Room: A311

Session Chair:

Angella Sell
Aalberts Surface Technologies, Livonia, MI

Lizeth Medina-Balliet
Neenah Foundry, Neenah, WI

The Effect of Carbon Equivalent and Nodularity on Multi-Axial Casting Wall Movement during Spheroidal Graphite Iron Solidification and Cooling (25-056)

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

Spheroidal Graphite Iron (SGI), also known as ductile iron, is an iron-carbon casting alloy used in industry for its good castability, balanced mechanical properties, and low cost. Ductile iron consists of round graphite nodules in an iron matrix. During solidification and cooling, ductile iron castings experience dynamic volume changes due to the precipitation of graphite nodules and formation of austenite. These dynamic volume changes can distort external casting surfaces, causing swell and shrinkage porosity. A novel apparatus was custom built to capture the casting wall movement in real time along three axes. This study aims to correlate Carbon Equivalent (CE) and nodularity to casting wall movement.

Marketing Division

Room: A315

Session Chair:

John Belmont
American Foundry Society, Schaumburg, IL

Safety as a Brand Attribute: Internal Buy-In and External Recognition for Your Foundry (25-189)

John Belmont, American Foundry Society, Inc., Schaumburg, IL

This session, developed by the AFS Marketing Division, will explore how a strong safety culture can enhance both internal operations and external brand reputation. Attendees will learn strategies for fostering internal buy-in, ensuring that safety is not just a compliance requirement but a core company value at all levels. The session will also highlight how prioritizing safety can serve as a powerful differentiator in the marketplace, attracting customers, talent, and industry recognition. Through real-world examples and insights from small and large foundries, participants will gain the tools needed to position safety as a defining attribute of their brand.

Metalcasting Research

Room: A314

Session Chair:

Mark Adamovits
Matthews International Corp., Searcy, AK

Quantifying Process Relationships for Surface Defects on Chemically-Bonded Sand Systems (25-129)

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

This presentation will provide an update on the current research into the causes of casting surface defect causes. Current progress on both defect scanning technologies and classification will be presented. Future efforts in determining process variable effects on defects in aluminum castings will also be discussed.

8 – 9 a.m.

Metalcasting Research

Room: A314

Session Chair:

Mark Adamovits
Matthews International Corp., Searcy, AK

Industry Best Practice Data Driven Design Allowable Properties for Some Common Alloys in CADS (Casting Alloy Data Search) Online Tool (25-130)

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

DLA funded and AMC/AFS managed research project has led to the development of a web-based casting alloy data search tool for the design and simulation engineers which provide engineering properties and in most cases fatigue with the supporting pedigreed data, such as chemistry, mold material, casting process, section thickness, type of test bar and heat treatment etc in contrast to the typical handbook static data with no or little supporting pedigree information. Improved data will enable better casting part designs capable of delivering a collection of long-term objectives, i.e., longer service life, lower scrap, lighter weight, and better performance. Through CADS, AFS provides current and qualified information generated using the latest methods and disseminates this information in a user-friendly format to both users and manufacturers of castings. Our latest effort will be presented and will be focused on developing industry best practice-data driven design allowable property values using standard MMPDS methods for 24 new alloys (two copper-base, four aluminum-base, six iron-base, and twelve steel-base grades) from over 11 foundries. The AFS foundry members provided the data and PDA LLC performed the data analysis using MMPDS established statistical method which takes into account the heat and lot variability from the same foundry as well as from one foundry to another foundry for the same alloy grade.

8 – 10 a.m.

The AFS Institute

Room: A316

The 10-Step Method for Corrective Action - Part One (25-153)

Patrick Kluesner, Grede Castings, Waterford Township, MI

Participants will be introduced to a basic overview of a casting defect analysis procedure: identification, composing a problem statement, recording process parameters, identifying the correct defect and its root cause for correction action. This course is an introduction to navigating the practical handbook, International Atlas of Casting Defects.

9 a.m. – 5 p.m.

Exhibit Hall A1-3

Exhibits Open

9:15 – 10:15 a.m.

Additive Manufacturing Division

Room: A313

Session Chairs:

Marshall Miller
3D Systems, Rock Spring, GA

Brandon Lamoncha
Humtown Products, Columbiana, OH

Process and Design Freedom with LightSpeed's BlueNano TM Binder-Enabled 3D Printing of Molds and Cores (25-041)

Daniel Shirkey, LightSpeed Concepts, Inc., Jackson, MI

Recent binder development innovations are enabling additive manufacturing of molds and cores like never before. LightSpeed Concepts Inc. of Jackson, Michigan has developed BlueNanoTM binder that is a sustainably sourced, organic, one-part binder system applicable for all common metals and is environmentally friendly without explosion or other health & safety risks, and fully reclaimable at relatively low temperature. The odorless binder can be used with all raw mold/core media (no mixing or pH management), does not require ovens or microwaves for curing, and the simple desanding/depowdering process eliminates quality defects, labor and costs from the process. Additionally, the free flowing desanding characteristic allows for gating, risering, and casting design features like small cavities, undercuts, blind risers, etc. that are impossible with traditional binders and methods, yielding lighter, stronger, and more sustainable castings.

Density and Surface Texture Measurements of 3D Printed Sand to Improve Molding (25-078)

Samuel Morris and Philip King, University of Main, Orono, ME

Within the field of 3D sand printing, there is a growing need to understand the anisotropic behavior of sand in the build envelope of 3D sand printers. For metal casting, this understanding will improve mold accuracy and design. This work provides methodologies to characterize printed sand's density and surface texture as related to orientation within a printer build envelope, two properties that directly impact liquid metal flow and solidification. Density of printed sand samples was found to vary based on the travel direction of the printer recoater. Surface roughness was found to be influenced by multiple factors, each raising the surface roughness by up to 13%. These findings highlight the importance of considering anisotropy in the design of 3D printed sand molds. The methodologies developed in this study provide a foundation for future research aimed at improving the modeling of complex 3D printed sand molds.

Aluminum & Light Metals Division

Room: A312

Session Chair:

Adam Kopper
Brunswick Corp., Fond du Lac, WI

Gas to Air Heat Recovery from Aluminum Melting Furnaces using Heat Pipe Technology (25-084)

Scott Harris, Solex Thermal Science, Alberta, Canada

Heat pipes are an effective and reliable way to recover heat from aluminum melting furnace gas streams in US foundries. Lower operating costs are achieved with a failsafe production bypass design, independent heat pipe reliability, and ease of maintenance. Heat pipes are proven in the dirty flue gas environments of aluminum melting furnaces and several cases will be presented.

Schedule is subject to change.

9:15 – 10:15 a.m.

Aluminum & Light Metals Division

Room: A312

Session Chair:

Adam Kopper
Brunswick Corp., Fond du Lac, WI

Methodology for Evaluating Converting Ar for N2 for Liquid Metal Treating: A Case Study (25-120)

Robert Mackay and Glenn Byczynski, Nemak, Southfield, MI

Well established liquid metal treatment is critical towards the production of high quality casting components made in North American foundries which compete on the worldwide markets. This also hold critically true for foundries cost of operations which can impact their ability to be competitive on the same worldwide markets. This manuscript is a case study on converting costly Ar used for rotary degassing to N2 without stopping production for metallurgical assessments on the inset gas conversion. However, it will be critical to review the melting processes involved as an insert gas replacement for cost optimizations may not be achievable in limited environments.

Engineering & Smart Manufacturing Division

Room: A315

Session Chair:

Greg Bray
Electric Controls & Systems, Birmingham, AL

Digital Characterization of Casting Surfaces (25-138)

Frank Peters, Iowa State University, Ames, IA; Daniel Schimpf, Volkswagen, Germany

Casting surface specifications are set based on aesthetics, functionality or a combination of both. To classify casting surfaces, visual inspections are performed by an operator who compares the casting surface to pictures or comparator plates that represent a certain roughness level. This inspection process is highly subjective, disagreements arise on the acceptance of a casting between the casting producer and buyer. To minimize these disagreements and use developments in 3D scanning, the objective of this project is to develop a digital surface characterization method. The method developed and implemented in this project utilizes underlying geometry estimation, abnormality detection, and a new roughness characterization formula based on a variogram to determine a surface roughness value. Tests were done to compare the new roughness characterization formula with existing quantification methods and to compare the results of the method with human operators.

Environmental, Health & Safety Division

Room: A314

Session Chair:

Earl Miller
Hiler Industries, La Porte, IN

PANEL: EHS Hot Topics (25-177)

Air Quality:
Jeet Radia, McWane, Inc., Birmingham, AL

Water, Waste & Byproducts Management
Dan Plant, Metal Technologies Corporate Center, Auburn, IN

Safety & Health
Mickey Hannum, McWane, Inc., Birmingham, AL

Environmental, Health & Safety Committees overview.

Steel Division

Room: A311

Session Chair:

Robert Tuttle
Western Michigan University, Kalamazoo, MI

Controlling Nitrogen Pick-Up during Induction Melting of Ultra-High Strength Cr-Mo-Ni-V Steels (25-022)

Kingsley Amatanweze, Viraj Athavale, Mario Buchely, Laura Bartlett, and Ronald O'Malley, Missouri University of Science and Technology, Rolla, MO; Daniel Field, DEVCOM Army Research Laboratory, Adelphi, MD

Nitrogen pickup during air induction melting can result in porosity and a loss of fracture toughness in ultra-high strength quenched and tempered steel castings. Nitrogen atoms are easily adsorbed into the liquid steel upon exposure to the air and argon shrouding alone has limited effectiveness. Previous studies have shown that proper charge sequencing and keeping a high amount of dissolved oxygen in the melt prior to tapping and deoxidation can limit nitrogen pickup in the melt. In the current study, the effect of melt practice and charging procedure on nitrogen pickup was studied as a function of hold time in a series of lab scale and commercially produced heats of a Cr-Ni-Mo steel intended for ground engaging equipment. By controlling the melting time, purity of charge materials, and development of a dome shrouding method, the nitrogen content was reduced from 170PPM to less than 80PPM.

Q&P Heat Treatment of a FeCSiMn Steel (25-026)

Robert Tuttle, Western Michigan University, Kalamazoo, MI; Mujeeb Shaik, Maynard Steel, Milwaukee, WI

The specialized quench and partition (Q&P) heat treatment process appears to have broad application, including in cast products. This study investigates the response of a 0.25C-1.7Si-3.4Mn cast steel to different Q&P heat treatment cycles. A 25 mm thick Y-block casting provided a longer solidification time and diffusion distance than has been done in this alloy before. Smaller samples were extracted from the Y-block casting for heat treatment. These were then examined to determine their hardness, microstructure, and phase formation. X-ray diffraction (XRD) confirmed phase evolution and retained austenite carbon content. Data also suggests that the time lengths for the various Q&P stages must be longer for thicker sections to achieve the desired structures and properties.

9:30 – 10:30 a.m.

Casting Designers and Buyers

Casting Source Theater in the AFS HUB - Booth 320

Session Chair:

Ben Yates
American Foundry Society, Schaumburg, IL

Reduce Defects to Reduce Rejects: Improving Quality in Your Castings (25-192)

Dr. Sudesh Kannan, Consultant, Schaumburg, IL

No one wants to deal with rejected product. Our metalcasting expert explains the causes behind the most common casting defects and what foundries can do to ensure your components meet your quality requirements.

10:30 – 11:30 a.m.

HOYT MEMORIAL LECTURE

Room: A411-A412

Servant Leadership: A Leadership Concept for Today's World (25-091)

Frank Headington, Retired, Neenah Foundry

Our world is a mess. People are suffering to some degree or another everywhere we look. One major reason the world is like this is that people are using the power model of leadership which focuses on power and control. That coupled with the reduction in interpersonal communications has created a more divisive climate at work and in our government relations with our citizens. Servant leadership is about serving people, not using people. Serving others is the most meaningful and satisfying way for leaders to live and lead. It begins with "the natural feeling that one wants to serve."

Since starting at Neenah Foundry in 1989, Frank Headington has over 49 years of foundry experience. He has a Master's of Science in Industrial Management from Georgia Institute of Technology and a Master's of Science in Ceramics Engineering from the University of Illinois at Urbana-Champaign. Respected for his expertise in metalcasting, Headington was the 2016 recipient of the AFS Peter L. Simpson Gold Medal. Headington has been an active member of AFS serving on numerous technical committees, the AFS Board of Directors, AFS Research Board and as AFS staff holding the position of Interim Technical Director from 2017-2020.

11:30 a.m. – 1:30 p.m.

Ray's in the City

Past Presidents' Luncheon

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

12:30 – 1:30 p.m.

Casting Designers and Buyers

Casting Source Theater in the AFS HUB - Booth 320

Session Chair:

Ben Yates
American Foundry Society, Schaumburg, IL

What to Ask a Prospective Foundry Partner (25-193)

Rachel Weber, Batesville Products, Lawrenceburg, IN

You've got your CAD design and specifications, but where do you begin the journey of evaluating which foundry is best suited to produce your casting? We'll walk you through all the questions you need to ask to make an informed decision – this checklist could prevent a costly mistake.

1 – 3 p.m.

WFO

TBA

WFO General Assembly

(Invitation only)

1:30 – 2:30 p.m.

Casting Designers and Buyers

Casting Source Theater in the AFS HUB - Booth 320

Session Chair:

Ben Yates
American Foundry Society, Schaumburg, IL

Selecting the Right Alloy

TBA

Getting the material properties required for a casting often hinges on using the correct metal alloy—and there are literally hundreds to choose from. Don't be inundated; be educated. This overview will equip you on the fundamentals of alloy selection and why foundries make different recommendations depending on the end-use application and your specifications.

1:30 – 3 p.m.

Environmental, Health & Safety Division

Room: A314

Session Chair:

Jeet Radia
McWane, Inc., Birmingham, AL

Property Risk Management and Insurance Strategies for Metalcasters (25-164)

Katie Hensley, Cottingham & Butler, Dubuque, IA

In the evolving landscape of property risk management, metalcasters face unique challenges that necessitate specialized insurance and risk engineering strategies. This paper explores the critical aspects of property risk management, focusing on the increased frequency of catastrophic events, the reinsurance dilemma, and the proactive steps metalcasters can take to improve their insurability and secure favorable insurance terms.

3D Printing Safety (25-175)

Jeff Krause, HA Group, Westmont, IL

The rapid adoption of 3D printing technology for foundry molds and cores has brought use of furan binder technology to many new facilities, some of which may not be fully aware of the inherent hazards of this binder system. This paper explains the chemical reaction hazards inherent in the furan binder technology and describes a comprehensive approach toward managing these hazards.

Foundry Safety Management System at Virginia Tech (25-092)

Alan Druschitz, Virginia Tech, Blacksburg, VA

The Environmental Health and Safety Department at Virginia Tech created a safety management system for the on-campus Kroehling Advanced Materials Foundry. This system was so successful that it was rolled out to the entire University. This paper describes the safety management system and how it is used by students, faculty, and staff at the foundry.

1:30 – 3 p.m.

Government Affairs

Room: A313

Session Chair:

Stephanie Salmon
AFS Washington Office, Washington, D.C .

Update on the Trump Trade Agenda: New and Future Tariffs, Status of USMCA & Efforts to Enhance Trade Enforcement (25-190)

Nicholas Birch, Schagrin Associates, Washington, D.C.; Brad Muller, Charlotte Pipe & Foundry Co., Oakboro, NC; Stephanie Salmon, AFS Washington Office, Washington DC

President Trump campaigned heavily on expansive trade policy changes and vowed to use tariffs to re-balance trade relationships and create leverage to win concessions and make deals on both economic and non-economic issues. Join us for this important session with Nick Birch, a Washington, DC-based trade lawyer, who will provide an overview of the new tariffs and likely forthcoming trade measures, how they might leverage international agreements, enhancing trade enforcement tools, and overview of filing a trade case.

Lost Foam Division

Room: A312

Session Chair:

Jeff Prickett
Metals Alloys & Refractories, Lenoir City, TN

Lost Foam Retrospective: A Look Back and Looking Forward (25-053)

Sarah Jordan and Mark DeBruin, Skuld LLC, Piqua, OH

The co-founders of Skuld have worked in lost foam casting since 2000. They have created numerous innovations including surface alloying with lost foam, low carbon steel in lost foam, thin walled ductile iron, and most recently the additive manufacturing evaporative casting (AMEC) process. This presentation will cover a brief history of lost foam casting and various now closed plants. Then we will pivot to a more optimistic view of the future outlook and what Skuld forecasts for the future.

Lost Foam Stainless Steel (25-031)

Marshall Miller, 3D Systems, Rock Spring, GA

In order to improve the possibility to re-shore castings sourced overseas to lower (cost) labor regions, and in accordance with the Mission Statement of the Lost Foam committee, a project to produce low carbon ASTM A352 Grade CF8M (.08% C maximum) stainless steel was proposed to and approved by the AFS Research Board. The market for these materials is currently dominated by the sand and investment casting processes. The Lost Foam process has significant potential advantages in this market by producing products with the delivery time advantages of sand casting, and the precision levels of investment casting. This paper shares test data and product results from tests conducted at 4 global production facilities, not laboratories, to produce ASTM A351 CF8M Stainless Steel with .08% maximum Carbon level in the Lost Foam Process. Results from testing at 4 separate foundries found that the process can produce high temperature stainless steel with a .015% max. carbon and indicators that adjustments to process parameters can likely produce the desired end result of .08% max. chemistry.

Steel Division

Room: A311

Session Chair:

Robert Tuttle
Western Michigan University, Kalamazoo, MI

Solidification of Medium Manganese Q&P Steels (25-073)

Robert Tuttle, Western Michigan University, Kalamazoo, MI

Quench and partition steels with medium manganese contents have attracted increasing interest for a variety of applications. This study examined two med-Mn steel alloys to better understand their solidification and phase reactions that occur. Thermal analysis results were compared to thermodynamic predictions to determine the validity of the predictions. Overall, the thermodynamic predictions were fairly accurate in terms of the liquidus and peritectic temperatures. However, the solidus temperatures differed dramatically. The as-cast microstructure was fully martensitic, which was not expected. Computed TTT and CCT diagrams were done to determine the predicted structure, but these did not accurately predict the observed microstructure.

PANEL: Feeding in Steel (25-157)

Gerald Richard, MAGMA Foundry Technologies, Inc., Schaumburg, IL; Joshua Gammariello, Foseco, Chattanooga, TN

The panel will answer questions on the best way to feed steel castings. These experts range from foundries, suppliers, and simulation experts. They will each provide insights into their approach to feeding and discuss best practices. The broad membership will help foundries learn about new techniques from across the industry.

Talent Development Division

Room: A314

Session Chair:

Cathy Potts
American Foundry Society, Schaumburg, IL

PANEL: From Toxic to Thriving: Boosting Engagement Through Positive Workplace Cultures (25-160)

Panelists:
Amanda Groves, Lodge Mfg. Co., South Pittsburg, PA;
Jim Peterson, ADECCO, Perryville, MO
Patrick Frazier, ME Global, Inc., Tempe, AZ
Derek Brown, Safepath Solutions, Birmingham, AL

You've heard it before…Culture has the power to make or break a team. Culture impacts EVERYTHING…from your ability to attract and retain talent to organizational performance to employee morale. During this panel discussion, several industry HR practitioners will discuss their experiences identifying and understanding the impact of toxic workplace attributes and working across their organizations to positively impact their company culture driving employee commitment and engagement.

1:30 – 3:30 p.m.

The AFS Institute

Room: A316

The 10-Step Method for Corrective Action - Part Two (25-153)

Patrick Kluesner, Grede Castings, Waterford Township, MI

Participants will be introduced to a basic overview of a casting defect analysis procedure: identification, composing a problem statement, recording process parameters, identifying the correct defect and its root cause for correction action. This course is an introduction to navigating the practical handbook, International Atlas of Casting Defects.

3 – 4 p.m.

Casting Source Theater in the AFS HUB - Booth 320

Casting Dreams Competition

The Casting Dreams program is a national program that provides local educational opportunities and industry connections that include casting design and production that qualify for local, regional and national competitions. The Casting Dreams Competition is designed for individuals ages 8 to 18, welcoming everyone who wishes to participate. 1st, 2nd, and 3rd place will be announced curing this session.

3:15 – 4:45 p.m.

Aluminum & Light Metals Division

Room: A312

Session Chair:

Carl Soderhjelm
ACRC, Irvine, CA

Development for High Cycle Fatigue Durability using the Precision Sand Casting Process (PSCP) Cast Component (25-119)

Robert Mackay and Glenn Byczynski, Nemak, Southfield, MI

The Precision Sand Casting Process (PSCP) using secondary grade aluminum is used to manufacture components that have complex architectures but also sustain high cyclical compression and tensile loads in service. The literature generally argues the key to improved fatigue life is to keep porosity as low as possible. There are multiple approaches in the casting development process to achieve improved fatigue durability. This paper reviews most of the main PSCP options which can address high cycle fatigue requirements in high horsepower (hp) applications and identifies the research needed in the future to further push secondary aluminum PSCP fatigue performance.

Conductivity and Structural Changes in Al-Ni Alloys with Varying Ni Content (25-112)

Kentaro Lunn, Diran Apelian, and Zac Han, University of California-Irvine, Irvine, CA

The Al-Si eutectic has been the standard casting alloy system since the early 1900's. However, its conductivity properties are inherently limited to ~50% and 70% of pure Al's in the as cast and heat treated states, respectively. The Al-Ni system is one of the leading candidates offering a potential for a higher combination of conductivity and mechanical properties. However, relationships between Ni content, conductivity, and structural changes have not been explored thoroughly for cast Al-Ni alloys. This study aims to clarify these microstructure-property relationships to provide guidance to alloy design efforts.

Formation of Graphene by Co2 Bubbling in Magnesium Melt to Synthesize Magnesium Composite (25-105)

Mehran Zare, Omid Ghaderi, Swaroop Behera, Kaustubh Rane, and Pradeep Rohatgi, University of Wisconsin-Milwaukee, Milwaukee, WI; Behzad Niroumand, Isfahan University of Technology, Isfahan, Iran

Carbon and its allotropic structures have been considered as promising materials in state-of-the-art applications. Since the invention of graphene, it has been extensively studied due to its enhanced properties. Graphene can be used in the manufacturing of metal matrix composites (MMCs) to enhance their mechanical, physical, and structural properties. The findings suggest that by employing CO2 bubbling, graphene-embedded magnesium composites can be successfully synthesized. Based on the previous works, with CO2 bubbling, Graphene embedded magnesium composite can be synthetized successfully, and mechanical and physical properties of final composite can be enhanced significantly. Furthermore, this paper presents the initial results from experiments performed at the University of Wisconsin-Milwaukee (UWM). Raman spectroscopy, scanning electron microscopy (SEM), and mechanical testing investigations demonstrate the formation of graphene within the magnesium matrix, leading to a 16.5% improvement in hardness compared to the control sample.

Metalcasting Research

Room: A314

Session Chairs:

Vasko Popovski
Ransom & Randolph, Canonsburg, PA

Benchmarking Shell Recycling, Productivity Metrics, and Risering Practices in the North American Investment Casting Industry (25-061)

Victor Okhuysen, Cal Poly Pomona University, Pomona, CA; Brian Began, American Foundry Society, Inc., Schaumburg, IL

This paper documents the results of a recent survey of the domestic investment casting industry. It was conducted in support of a research project co-sponsored by the project team and by the Defense Logistics Agency-Troop Support, Philadelphia, PA and the Defense Logistics agency Information Operations, J68, Research and Development, Ft. Belvoir, VA. The 26-question survey shed light on prevalent industry practices related to risering castings, shell and casting productivity, and they use/opportunity involve in recycling investment casting shells.

The results largely confirmed the research team's observations of the industry and provided metric references for the various opportunities involved in developing improved risering tools/technologies specific to investment castings, recycling shells, and improving productivity in shell production.

Investment Casting Agility and Sustainability Research (AMC/DLA Funded) (25-140)

Jiten Shah, Product Development & Analysis LLC, Naperville, IL; Brian Began, American Foundry Society, Inc., Schaumburg, IL

This five-year research program focusses on reducing shell drying cycle time and smart pattern burn out algorithm; recycling and reusing alumino-silicate investment shells and better understanding feeding behavior of investment cast steels by establishing feeding distances and risering guide. We will present the progress made since the start of the project in October 2023 with some preliminary results to share and outline the investment foundry participation into this on-going project.

World Foundry Organization (Molding)

Room: A313

Session Chair:

Brian Rachwitz
EJ, East Jordan, MI

Enhancing Indian Bentonites for Foundry Green Sand Applications with the Addition of Minerals from India (25-013)

Victor LaFay and Patricia LaFay, Common Sense Applications LLC, Cincinnati, OH; Robert Steele, FACT, Ponte Vedra Beach, FL

India has the second-largest metal casting production in the world, with green sand molding as one of its predominant processes. Naturally occurring Indian bentonite has been used successfully for many years. Enhancing these bentonites to produce high-quality metal castings and reduce bond consumption by adding naturally occurring minerals has proven successful.

Influence of Powder Additives on the Final Properties of Inorganic No-Bake, Inorganic Cold Box and Hot Box Binders (25-044)

Sritama Kar, Tim Ziehm, Markus Jonek, and Martin Oberleiter, ASK Chemicals, Dublin, OH

In recent years, inorganic sodium silicate binders for Hot Box-processes have garnered significant attention within the foundry industry due to their environmental as well as processual benefits and their potential in producing critical aluminum cast parts for automotive engines, e-engines, suspensions and subframes. As water-based systems, these binders emit zero harmful educts of reactions, aligning with stringent environmental standards. As regulations tighten it is compulsory to transfer this experience of core and mold making in Hot Box processes to other segments of inorganic binder systems: Ester-cured No-Bake and CO2-cured Cold Box. This study investigates the effects of powder additives on the performance of No-Bake and Cold Box sodium silicate binders, with the goal of enhancing the overall performance of these

World Foundry Organization (Molding)

Room: A313

Session Chair:

Brian Rachwitz
EJ, East Jordan, MI

inorganic binder systems. The findings are expected to provide valuable insights for improving the bandwidth of inorganic binder applications, expending these further into No-Bake and Cold Box applications, opening an environmentally friendly solution to non-automotive foundries that need to reduce their emissions or want to improve their EHS footprint for the sake of employees, stakeholders, and shareholders.

3:15 – 4:45 p.m.

Young Professionals

Room: A315

Session Chair:

Cathy Potts
American Foundry Society, Schaumburg, IL

PANEL: Choosing a Path Forward: Balancing Technical and Management Experiences (25-159)

Panelists:
Jay Morrison, Carpenter Brothers Inc., Mequon, WI
Mark Didion, Didion International, Inc.,Saint Peters, MO
Jarek Olszak, Laempe Reich, Trussville, AL
Ashley Folden-Ecker, MacLean Power Systems, Mankato, MN

Do you feel like you have to choose between deepening your technical expertise or stepping into management?

What if you could blend both to create a unique and rewarding career path?

In this engaging panel, we'll dive into the stories of professionals in the metalcasting industry—each with their own journey of balancing technical mastery and leadership roles. Whether you're drawn to deepening your expertise or the challenges of leading teams, our panelists will share how they navigated their careers and what they looked for in others.

Whether you're just starting out or looking to pivot, this panel will equip you with practical guidance and inspiration to carve your own successful path in the dynamic world of metalcasting.

Thank you to our Sponsors:

5 – 6 p.m.

Room: A404-405

Young Professionals Reception

You're Invited! AFS Young Professionals Networking Reception – Cocktails & Great Connections! Ready to mix, mingle, and make valuable connections at CastExpo 2025? Join us for the AFS Young Professionals Networking Reception in Room A404-A405 at the Georgia World Congress Center! Enjoy some beverages while networking with fellow rising leaders in metalcasting. Whether you're already on the management track or aspiring to be, this is the perfect chance to build relationships, swap ideas, and take your career to the next level—all in a relaxed, fun atmosphere. Don't miss out—grab a drink and grow your network! We can't wait to see you there!

Thank you to our sponsors:

6 – 9 p.m.

College Football Hall of Fame

Alumni Dinner

(AFS Alumni only. Ticket Required)

Alumni will experience the College Football Hall of Fame touring the special exhibits and permanent installations, while enjoying bold American cuisine. Must be a member of AFS Alumni to attend.

Tuesday, April 15, 2025

7 – 8 a.m.

Room: A302

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 - 10:30 a.m.

Outside Technical and Management Sessions

Coffee Station by AFS Technical and Management Sessions

Coffee Sponsored By:

8 – 9 a.m.

Additive Manufacturing Division

Room: A313

Session Chair:

Jerry Thiel
Precision Casting Technologies, Dysart, IA

Dave Rittmeyer
Matthews Additive Technologies

Utilizing 3D Sand Printing to Create Community Art (25-097)

Elijah Kallio, Waupaca Foundry, Waupaca, WI

How we used our 3D sand printer to create castings for a community art project for the city of Waupaca.

Utilizing 3D Printing to Solve Supply Issues (25-156)

Ryan Hansch, Waupaca Foundry, Waupaca, WI

We recently encountered a scenario where the sole supplier of our date codes went out of business and there were no readily available commercial alternatives. We developed a program within CAD modelling software to make models of our date codes as the dates change. We then utilized commercial/industrial 3D printers to begin printing all of our date tag inserts for the whole company.

Metalcasting Research

Room: A314

Session Chair:

Mark Osborne
Wabtec, Haslet, TX

Progress and Problems in the Production of Nano-Reinforced Aluminum Alloys (25-128)

David Weiss, Vision Materials, Manitowoc, WI

The production of aluminum nanocomposites with conventional and experimental aluminum alloys reinforced with nano-sized alumina using a master alloy is discussed. The reinforcement phase can have both positive and negative interactions with various alloying elements in both the liquid matrix and the solid master alloy. Magnesium is usually bound to the particles, reducing the amount available for solid-solution strengthening or as mixed precipitates. On the other hand, certain elements (Mg, Ce) are highly reactive aiding in the dispersion of the master or reduce the surface tension of the matrix alloy (Mg, Zr, Ni, Ce), or produce exothermic reactions during mixing (Ce,Zr,Cu2O, CuO) which also aids in master alloy dispersion.

World Foundry Organization (Engineering)

Room: A312

Session Chair:

Doug Starr
Saudi Mechanical Industries, Strongsville, OH

Avoiding Defects Appearing During Shut Down Phase in Vacuum Arc Remelting Using Process Modeling (25-071)

Swapnil Salokhe and Ole Koeser, ESI Group, Novi, MI; Vahid Rastegar, Materion Newton, Inc., Newton, MA

A leading producer of specialty materials uses the vacuum arc remelting process to manufacture high-quality ingots of Niobium alloys for aerospace, defense, and semiconductor applications. Under specific ingot geometries and process parameters, they observed large shrinkage cavities at the top of the produced ingots, impacting the process's productivity (see Figure 1). Despite diligent efforts, minimizing or eliminating these defects has been difficult, posing an obstacle to their production efficiency.

To address the production issue, it was decided to use process modeling using ProCAST casting FEM software solution to simulate the principal aspects of the specific volume arc remelting process to identify the potential root causes of the defect creation and, subsequently, identify viable solutions for mitigation.

Revolutionizing Metalcasting: Mega Casting Innovations and Complete Process Simulation (25-104)

Loic Calba, Swapnil Salokhe, and Sandesh Kharvi, ESI Group, Novi, MI; Loic Calba, University of Metz-Lorraine, Bagneux, France

Mega casting presents significant challenges and opportunities in metal casting. This paper examines how advanced process simulation technologies are crucial for overcoming these challenges and maximizing Mega casting innovations. It begins with a co-design castability check, highlighting the importance of incorporating casting considerations early in design to tackle Mega casting's unique hurdles. The paper discusses gate design optimization and how simulation tools manage large-scale gating complexities for better outcomes. It also addresses the integration of Mega press capacity with process modeling for precise casting control, identifying and mitigating defects, and enhancing overall quality. Additionally, the paper explores strategies to predict and mitigate part deformation and prolong die life, emphasizing simulation's role in reducing development time and improving accuracy. Ultimately, this paper shows how process simulation technologies are transforming metal casting, enabling unprecedented advancements in Mega casting while addressing its inherent challenges.

8 – 10 a.m.

The AFS Institute

Room: A316

Introduction to Casting Design (25-155)

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

Introduction to Casting Design is an overview of the Institute's popular, 2-day Casting Design course. Attendees will explore alloy selection, metalcasting process capabilities and limitations, and their effects on casting design, including the impact of secondary operations.

8 a.m. – Noon

Georgia World Congress Center Lobby

Registration Open

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9 a.m. – Noon

Exhibit Hall A1-3

Exhibits Open

9:15 – 10:15 a.m.

Additive Manufacturing Division

Room: A313

Session Chair:

Jason Walker
The Ohio State University, Columbus, OH

Rich Lonardo
Defense & Energy Systems, Poland, OH

Advancing Sustainability in 3D Sand Printing: Reclamation and Reuse of Non-Printed Sand to Improve Process Economics (25-124)

Kelley Kerns and Michael Anthony, HA Group, Westmont, IL; Nathaniel Bryant, University of Northern Iowa, Cedar Falls, IA; Dave Rittmeyer, Matthews Additive Technologies; Mark Lamoncha, Humtown Products, Columbiana, OH; Michael Anthony, HA Group, New Castle, PA

The growth of 3D sand printing in metal casting has resulted in substantial non-printed waste sand from sand core production using binder jetting technology. This research investigates methods for blending, mechanical and thermal reclamation methods to recycle this waste sand, aiming to improve sustainability and reduce costs in additive manufacturing. By evaluating these techniques' effectiveness in maintaining sand properties, the study seeks to establish sustainable practices for sand reuse and reclamation. The findings are expected to aid in developing guidelines for using reclaimed sand in 3D sand printing applications.

Prototypes Produced using Additive Manufacturing Compared to Alternate Methods (25-090)

Bernard Potts, Kimura Foundry America, Shelbyville, IN

This paper compares 3D printed prototypes to other methods used to produce prototypes. The prototype production methods are as follows. 3D printed parts, machined parts from billet, cast prototype parts using conventional tooling such as wood or metal patterns, prototype castings using 3D printed plastic patterns and Poly/Styrofoam patterns. Comparisons of the various methods will be made considering delivery, quality and cost. Also addressing how much technical expertise that will be required to produce and quality part. The equipment will also be required to manufacture the prototypes will also be discussed. Example: 3D Printers for Sand, Metal, Plastic etc.

Aluminum & Light Metals Division

Room: A312

Session Chair:

Alan Luo
The Ohio State University, Columbus, OH

Material Characterization of Aluminum Castings Using Machine Learning Techniques (25-101)

Meysam Akbari, Liang Wang, and Qigui Wang, General Motors, Warren, MI

The emergence of ML techniques has significantly improved the accuracy and efficiency in materials characterization. This paper reviews the application of ML algorithms in microstructure analysis and defect detection processes of aluminum castings at GM. By leveraging ML methods, multiple ML models were trained to automatically identify and classify different types of casting defects and microstructural features. Advanced image processing techniques, combined with convolutional neural networks (CNNs), enable the detection of casting defects such as shrinkage porosity and oxides and multiscale microstructure features for instance eutectic phases and secondary dendrite arm spacing of aluminum. This study highlights the advantages of the developed ML models in the accuracy and reduction of measurement time in the lab and reducing the reliance on manual analysis and subjective judgment. The findings emphasize the significant impact of ML techniques on metallurgical research and industrial applications, enhancing the reliability and performance of material analysis tools.

Structural Casting Alloys with Highest Recycling Content and Lowest Carbon Footprint (25-123)

Jay Armstrong and Grant Hatfield, Trialco, Chicago Heights, IL; Martin Hartlieb, Viami International, Inc., Quebec, Canada

With the electrification of vehicles, less powertrain castings and more structural castings are needed. Powertrain castings were mainly made from secondary alloys. Structural castings have been made from primary alloys to guarantee the purity and consistency needed for those safety critical castings. Today not only post- and pre-consumer scrap is coming to the market and must find new homes. Know-how in terms of scrap recycling, segregation and sorting, as well as melt treatment/cleaning practices have been improving a lot. This allows us today to produce structural die casting alloys with high recycling rates and therefore low carbon footprint, without negatively impacting their quality and performance. This paper describes latest trends and developments on this topic and describes which alloys can be made with which types of scrap and what are the limiting factors.

Schedule is subject to change.

9:15 – 10:15 a.m.

Government Affairs

Room: A315

Session Chair:

Stephanie Salmon
AFS Washington Office, Washington, D.C.

Don't Sit on the Sidelines: What Metalcasters Can Expect from the Trump Administration and Congress in 2025 (25-191)

Stephanie Salmon, AFS Washington Office, Washington, D.C.; Brad Muller, Charlotte Pipe & Foundry Co., Oakboro, NC

Learn about the key tax, trade and workplace matters that AFS is weighing in on in Washington, D.C. as we continue to work to promote pro-growth measures and halt the regulatory onslaught. The expiration of the major portions of the Tax Cuts and Jobs Act is the catalyst for a major tax reform event in 2025 – metalcasters and suppliers will learn about the progress to shape the tax package.

9:30 – 10:30 a.m.

Casting Designers and Buyers

Casting Source Theater in the AFS HUB - Booth 320

Session Chair:

Ben Yates
American Foundry Society, Schaumburg, IL

Rapid Prototyping and Advanced Manufacturing

TBA

The metalcasting industry is experiencing a tremendous evolution right before our eyes as 3D printing super-accelerates the foundry's ability to produce prototypes, molds, and cores—giving you unprecedented go-to-market speed. Hear the latest advancements and success stories happening throughout the North American manufacturing landscape.

10:30 – 11:30 a.m.

KEYNOTE

Room: A411-A412

Reshoring Update for North American Foundries (25-170)

Harry Moser, Founder, The Reshoring Initiative

Reshoring and foreign direct investment (FDI) have brought back over 700,000 U.S. manufacturing jobs in recent years. At the same time, the COVID crisis demonstrated the risk of long supply chains. These trends have drawn attention to the advantages of reshoring and nearshoring.

Harry Moser, Founder of the Reshoring Initiative, will provide fresh new examples of how U.S. foundries are taking advantage of the trend toward shorter supply chains and what that means for your company and your customers. Plus, discover how Reshoring Initiative's Total Cost of Ownership Estimator and the Import Substitution Program can help your company land contracts that otherwise would have gone overseas.

Noon

CastExpo 2025 Concludes

Schedule is subject to change.

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