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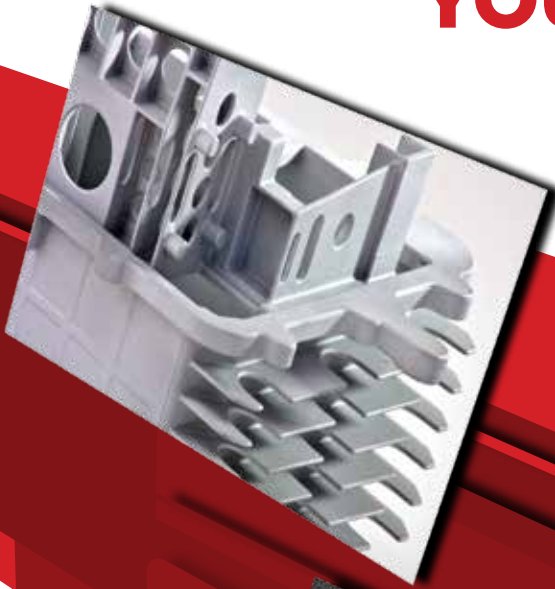
# METALCASTING

APRIL 25-27, 2017  
MILWAUKEE, WISCONSIN

# CONGRESS

## YOUR TIME TO SHINE

Connect with the  
metalcasting industry supply chain  
and advance your career at  
Metalcasting Congress.



Register at [www.metalcastingcongress.org](http://www.metalcastingcongress.org)

121<sup>st</sup>

# METALCASTING

APRIL 25-27, 2017  
MILWAUKEE, WISCONSIN

# CONGRESS

## Your Casting Future Starts Now. It's Time.

Metalcasting Congress is your chance to connect with suppliers, peers and customers and catch new ideas to excel at your job and improve your business. This year, take advantage of the heralded technical and management sessions PLUS Institute courses, keynote speakers Harry Moser and Doug Trinowski, shared interest group meetings, and the AFS Hub on the show floor.



## KEYNOTE SPEAKERS

### Manufacturing Reshoring

Tuesday, April 25, 2017 • 10:30-11:30 a.m.

Harry Moser is the founder of the Reshoring Initiative, established to bring back manufacturing jobs from overseas. He participated actively in President Obama's Jan. 11, 2012, Insourcing Forum at the White House, won *The Economist* debate on outsourcing and offshoring, and received the Manufacturing Leadership Council's Industry Advocacy Award in 2014. He has experience in manufacturing and metalcasting. Moser also will be leading a workshop on quantifying domestic sourcing's financial benefits on Tuesday, April 25, from 3:15-4:45 p.m.



**Harry Moser**



**Doug Trinowski**

### Hoyt Memorial Lecture: The Power and Need for Research in Metalcasting

Thursday, April 27, 2017 • 10:30-11:30 a.m.

This lecture will compare and contrast how research is conducted in other countries, primarily those in the European Union. Also, the need for improving the technical transfer process, taking fundamental research and commercializing it to improve the competitiveness and sustainability of the North American metalcasting community will be discussed.

# SHOW LOCATION & SCHEDULE

Wisconsin Center  
400 W. Wisconsin Ave.  
Milwaukee, WI 53203

## Tuesday, April 25

### Technical & Management Sessions

8 a.m.-4:45 p.m.

### Institute Course

8-10:30 a.m.

### Exhibitor Set-up (Hall A)

10 a.m.-5 p.m.

### Keynote Speaker: Harry Moser

10:30-11:30 a.m.

### Copper Luncheon (ticket required)

11:30 a.m.-1 p.m.

### Institute Course

1:30-4:45 p.m.

### Reshoring Workshop

3:15-4:45 p.m.

### Annual Banquet (ticket required)

6 p.m. Cocktails, 7 p.m. Banquet  
Hilton Milwaukee City Center

## Wednesday, April 26

### Women in Metalcasting Breakfast

7:30-9 a.m.

### Technical & Management Sessions

8 a.m.-4:45 p.m.

### Institute Course

8-11:30 a.m.

### Exhibits Open

10 a.m.-6 p.m.

### Division Recognition Luncheon (ticket required)

11:30 a.m.-1 p.m.

### Institute Course

1:30-4 p.m.

### Future Leaders of Metalcasting Meeting

3-5 p.m.

### Reception With Exhibitors in Exhibit Hall

4:30-6 p.m.

### Alumni Dinner

### (AFS Alumni only, ticket required)

6:30 p.m.

Hilton Milwaukee City Center.

## Thursday, April 27

### Technical & Management Sessions

8-10:15 a.m.

### Exhibits Open

9 a.m.-3 p.m.

### Hoyt Memorial Lecture: Doug Trinowski

10:30-11:30 a.m.

### President's Lunch & Annual Business Meeting (ticket required)

11:30 a.m. - 1 p.m.

### AFS Silica Exposure Control Workshop

(separate registration required)

1-4:30 p.m.

## THE HUB

Our dedicated area for connecting with AFS staff and other attendees returns this year with the addition of the AFS Bookstore, member services, a makerspace and Casting of the Year display. Centrally located on the exhibit floor, The Hub is the place to experience all AFS has to offer its members and customers.

### Member Services

- Talk with AFS membership director Leo Baran about all levels of membership and AFS products and services.
- Demo AFS' social network CastingConnection.
- See the AFS Institute course offerings and test drive an e-Learning module.
- Attend a town hall meeting hosted by AFS President Jeff Cook.
- Hear about what's new at AFS from AFS CEO Doug Kurkul.

### Makerspace

- Make your own casting.
- Check out AFS' new 3-D printer as it operates during show floor hours, printing a sample of the pattern used in the make-your-own-casting demonstration.

### Plus

- AFS Bookstore
- Casting of the Year display

# SPECIAL EVENTS

All events take place at the Wisconsin Center unless otherwise noted.

## Copper Luncheon

**Tuesday, April 25 | 11:30 a.m. | \$55 | Ticket required**

The Copper Division will present its David Kunkel Distinguished Service Award along with the Copper Division Scholarship at the luncheon. Open to everyone with an interest in copper alloys.

## Annual Banquet

**Tuesday, April 25 | Cash Bar 6-7 p.m. | Awards, Dinner, Entertainment 7-10 p.m. | \$110 | Ticket required | Hilton Milwaukee City Center**

Join us for the presentation of AFS's highest honor, the Gold Medal, to **Gary Gigante** and **Sara Joyce**.

Gigante, retired CEO, Waupaca Foundry Inc. (Waupaca, Wisconsin), will receive the Peter L. Simpson Gold Medal for long-term contributions to the sustainability of the metalcasting industry through environmental stewardship, technological advances, and the development of people in the industry.



**Gary Gigante**



**Sara Joyce**

Joyce, vice president of quality and technical assurance, Badger Mining Corp. (Berlin, Wisconsin), will receive the William H. McFadden Gold Medal for technical contribution to the foundry industry through groundbreaking research, technical articles and presentations, contributions to books, committee service, and a commitment to advancing the industry.

The Gold Medal presentations will be followed by entertainment.

## Women in Metalcasting Breakfast

**Wednesday, April 26 | 7:30 a.m.**

This event is open to members of the Women in Metalcasting group and features a continental breakfast and networking with women who work in all different facets of the metalcasting industry.

## Division Recognition Luncheon

**Wednesday, April 26 | 11:30 a.m. | \$55 | Ticket required**

This luncheon will feature the presentation of the Best Paper and Division awards, as well as the Applied Research and Howard F. Taylor Award.

## Future Leaders of Metalcasting Meeting

**Wednesday, April 26 | 3 p.m.**

FLM members and those interested in joining the FLM group are invited to attend this biannual event.

## Reception With Exhibitors

**Wednesday, April 26 | 4:30 p.m.**

Attendees are invited to mingle on the show floor with exhibitors and enjoy refreshments and light hors d'oeuvres.

## Alumni Dinner

**Wednesday, April 26, 2016 | 6:30 p.m. | \$100 | Ticket required | Hilton Milwaukee City Center | Must be alumni to attend.**

## President's Lunch & Annual Business Meeting

**Thursday, April 27 | 11:30 a.m. | \$55 | Ticket required**

Join the annual business meeting where the election of AFS officers and directors will be announced. In addition, the AFS Awards of Scientific Merit, Service Citations, Casting of the Year, Corporate Contribution Award and Millionaires Safety Awards will be presented.



# TECHNICAL & MANAGEMENT PROGRAM

**Session Categories:** Business of Metalcasting  
Environmental Health & Safety  
Casting Design & Purchasing  
Ferrous

**Nonferrous  
Molding  
Engineering & Technology  
Professional Development**

*Note: Room numbers  
subject to change.  
Refer to on-site  
Show Guide for most  
accurate listings.*

## Tuesday, April 25

**8-9 a.m.**

### **ROOM 203AB**

#### **Investigation of Microporosity Formation in Low-Lead Cu-Based Alloys (17-103)**

*Aaron Kelley, Robin Foley, John Griffin, Charles Monroe, University of Alabama at Birmingham (Birmingham, Alabama)*

Dimensionless Niyama theory provides a model behind the formation of microporosity in alloy solidification. The combination of long solidification ranges, low thermal gradients, high cooling rates, and dissolved gases leads to a significant amount of microporosity during solidification. To study the microporosity formation in a low lead copper alloy, a wedge casting with variation in cooling rate and thermal gradient was studied.

**Category: Nonferrous**

#### **Alternatives Analysis for Lead-Free Copper Alloy Cast Metal Water Components (17-145)**

*Greg Svoboda, I Schumann & Co. (Northfield, Ohio); Mike Buyarski, The Federal Metal Co. (Bedford, Ohio)*

New legal regulations have been implemented that limit the amount of lead in materials used for potable water (water for human consumption). Multiple alloys are available which meet current government regulations and can be tailored to provide the best performance for each specific component application. This presentation will review common copper alloys for water components, current applications and relevant industry specifications.

**Categories: Nonferrous, Casting Design & Purchasing, Environmental Health & Safety**

### **ROOM 202AB**

#### **Panel: Lost Foam Facility Startup Case Histories (17-130)**

*Ed Endebrook, Ende Machine & Foundry (Lewiston, Idaho); Sid Tankersley, American Foam Cast Inc. (Sylacauga, Alabama)*

How does one navigate the challenges involved to successfully start up a lost foam foundry?

In this session, the owners of two successful lost foam foundries will share from their own unique perspectives on why they first decided to go forward with lost foam and what financial barriers challenged them, as well as issues on labor, regulations and the technical process.

**Categories: Molding, Business of Metalcasting**

### **ROOM 202DE**

#### **Conditions That Affect Ductile Iron Magnesium Treatment and Inoculation (17-140)**

*Marc King, Globe Metallurgical Inc. (LaPorte, Indiana)*

A cause and effect analysis of conditions that cause poor Mg recovery, premature Mg boil, and inoculation nucleation fade will be presented.

**Category: Ferrous**

### **ROOM 202C**

#### **Impact of Firing Temperature on Phase Transformations and Properties of Silica-Based Investment Shell Molds (17-085)**

*Mingzhi Xu, Simon Lekakh, Von Richards, Missouri University of Science & Technology (Rolla, Missouri)*

In this session, influences of thermal process temperature on the thermal and mechanical properties of silica-based shell molds are investigated.

**Category: Molding**

#### **Reclamation and Reuse of Shell Ceramics in Investment Casting (17-104)**

*Victor Okhuysen, Michael Landeros, Hardik Shah, Cal Poly Pomona University (Pomona, California)*

This report is on investigations of the reclamation and reuse of shell ceramics in investment casting. Bars of ceramic were mixed using recipes based on fused silica and aluminosilicates common to investment casting. The bars were tested for green strength and hot strength at two temperatures. Then, the reclaimed material was remixed and retested, and the results were compared to the virgin mixes.

**Categories: Molding, Environmental Health & Safety**

Tuesday, April 25 (continued)

**8-10:30 a.m.**

### **ROOM 203D**

#### **AFS Institute Course: Casting Material Properties**

*Shelly Dutler, AFS Institute (Schaumburg, Illinois)*

This course will provide an in-depth discussion on the expected performance of a casting and mechanical properties based on production processes.

**Categories: Professional Development, Casting Design & Purchasing, Engineering & Technology**

**9:15-10:15 a.m.**

### **ROOM 202C**

#### **Staged Growth of Spheroidal Graphite in Ductile Irons (17-087)**

*Jingjing Qing, Von Richards, David Van Aken, Mingzhi Xu, Missouri University of Science & Technology (Rolla, Missouri)*

In this research report, growth of spheroidal graphite particles in ductile irons occurred in stages, which followed different mechanisms during solidification of ductile iron. Graphite nodules were retained at different growth stages in the quenching experiments. Surface and internal features of graphite were examined using scanning electron microscopy and transmitted electron microscopy.

**Category: Ferrous**

#### **Reassessment of Nucleation Models for Spheroidal Graphite Through Advanced SEM Analysis (17-031)**

*Gorka Alonso, IK4-Azterlan (Durango, Spain); Doru Stefanescu, The Ohio State University (Columbus, Ohio) and University of Alabama (Tuscaloosa, Alabama); Pello Larrañaga, Esther de la Fuente, IK4-Azterlan (Durango, Spain); Ramon Suarez, IK4-Azterlan and Veigalan Estudio (Durango, Spain)*

To understand nucleation of spheroidal graphite, interrupted solidification of specimens obtained from Mg-treated melts was used to minimize the size of the graphite nodules. A field emission gun scanning electron microscope spotted inclusions inside the graphite, not visible on the metallographic field. The distribution and amounts of the elements were analyzed through spectrums, mapping and line scans. A thermodynamic software evaluated the probability of formation of inclusions.

**Categories: Ferrous, Engineering & Technology**

### **ROOM 203AB**

#### **Panel: Foundry Technology (17-093)**

*Dave Rittmeyer, Hoosier Pattern Inc. (Decatur, Indiana); Greg Groth, Exact Metrology Inc. (Brookfield, Wisconsin)*

The presenters will discuss practical uses of technology in the foundry.

**Categories: Engineering & Technology, Nonferrous**

### **Room 202AB**

#### **Panel: Recent Developments in Lost Foam (17-131)**

*Melissa Wallum, StyroChem Canada Ltd. (Baie-D'Urfe, Quebec, Canada); Marshall Miller, Flowserve (Irving, Texas)*

The potential of producing lost foam patterns/castings with improved surface finish and thinner wall sections will be discussed in this presentation. The session will cover the use of smaller "X-grade" sized EPS beads and the use of a hot air inline expander, which can eliminate the need for the bead to stabilize prior to molding to allow more consistent pattern properties.

**Categories: Molding, Engineering & Technology, Casting Design & Purchasing**

### **ROOM 202DE**

#### **Panel: Practical Induction Melting Methods for the 21st Century (17-135)**

*Jack McMillin, Ajax Tocco Magnethermic Corp. (Warren, Ohio); John Oneson, Kohler Co. (Kohler, Wisconsin); Joe Henry, John Deere Foundry Waterloo (Waverly, Iowa); Rick Hall, Rochester Metal Products Corp. (Rochester, Indiana)*

The panel will discuss practical methods of the induction melting processes being used in modern foundries in the 21st century.

**Category: Ferrous**

**10:30-11:30 a.m.**

### **BALLROOM A**

#### **Keynote: Manufacturing Reshoring**

*Harry Moser, Reshoring Initiative*

Harry Moser is the founder of the Reshoring Initiative, established to bring back manufacturing jobs from overseas. He participated actively in President Obama's Jan. 11, 2012, Insourcing Forum at the White House, won *The Economist* debate on outsourcing and offshoring, and received the Manufacturing Leadership Council's Industry Advocacy Award in 2014.

**Categories: Business of Metalcasting, Casting Design & Purchasing**

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**1:30-3 p.m.**

**ROOM 202C**

**Panel: Solution Strengthened Ductile Iron—A Non-Traditional Approach (17-119)**

*Zayna Connor, American Foundry Society (Schaumburg, Illinois); Joseph Keske, Waupaca Foundry (Marinette, Wisconsin); Cathrine Hartung, Elkem Foundry Products (Kristiansand, Norway); Delin Li, CanmetMATERIALS, Natural Resources Canada (Hamilton, Ontario, Canada)*

The panel will inform the industry about the recent developments in solution strengthened ductile iron.

**Categories: Ferrous, Engineering & Technology, Casting Design & Purchasing**

**ROOM 203AB**

**Panel: Respirable Silica in the Casting Finishing Area (17-109)**

*Eric Pylkas, Stantec (Mequon, Wisconsin); Bob Scholz, TRC Companies Inc. (Brookfield, Wisconsin)*

The panel will focus on ways to utilize technology to help foundries define root causes of exposure to respirable silica and use work station design, ventilation and work practices to control silica exposure.

**Categories: Environmental Health & Safety, Nonferrous**

**ROOM 202AB**

**Panel: Additive Manufacturing: Transformational or Disruptive? (17-150)**

*Tom Prucha, MetalMorphosis LLC (Rochester Hills, Michigan); Steve Murray, Hoosier Pattern Inc. (Walkerton, Indiana); Tom Mueller, Mueller AMS (New Berlin, Wisconsin)*

This session will look at how additive manufacturing has the ability to unleash the power of design and manufacturing efficiency in metalcasting. Examples of its integration in product and process development, prototyping, low volume, complex part manufacturing and even high volume will be presented, as well as the business cases for considering additive manufacturing. Will it transform our industry or potentially put us out of business? Become part of the discussion.

**Categories: Engineering & Technology, Business of Metalcasting, Molding**

**Winning New Casting Business in the Digital Age (17-091)**

*David Knapp, Glidewell Specialties Foundry Company (New Albany, Ohio)*

This marketing session explores how fast-moving technology has redefined casting buyer/seller relationships and virtually replaced traditional ways of conducting business in less than a decade. Some foundries appear defocused from the need for shifting sales strategies and pay more attention to fulfilling orders and managing production costs as a means to the bottom line. The presentation examines existing industry sales staffs and demographics and discusses typical foundry reactions to change. Even in this digital world, the presenter believes the direct salesperson is still vital, but his role is overdue for change.

**Category: Business of Metalcasting**

**ROOM 202DE**

**Panel: The Cupola Water Cooling System (17-134)**

*Trevor Shellhammer, Shellhammer Consulting (Lehighton, Pennsylvania); David Kasun, Kuttner LLC (Port Washington, Wisconsin); Jeremy Mowry, American Cast Iron Pipe Company, (Birmingham, Alabama)*

Opportunities to increase the life of the cupola shell and tuyeres will be discussed. Appropriate installation and maintenance will be reviewed, in addition to failure analysis. Specific properties of copper tuyeres will be presented in addition to surface treatment to increase durability. Tuyere designs and configurations will be offered for consideration to enhance cupola efficiency and coke consumption rate. New developments in tuyere leak detection, instrumentation features, and safety features as well as water quality considerations will also be presented.

**Category: Ferrous**

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**1:30-4:45 p.m.**

**ROOM 203D**

**AFS Institute Course: Identifying the Correct Casting Defect**

*Dr. Sudesh Kannan, Co-Power LLC (Schaumburg, Illinois)*

Participants be given a basic overview of the casting defect analysis procedure.

**Categories: Professional Development, Casting Design & Purchasing, Engineering & Technology, Nonferrous, Molding, Ferrous**

Tuesday, April 25 (continued)

**3:15-4:45 p.m.**

**ROOM 203E**

**Manufacturing Reshoring Workshop**

*Harry Moser, Reshoring Initiative*

Moser will lead a workshop on quantifying domestic sourcing's financial benefit for companies or their customers.

**Categories: Business of Metalcasting, Casting Design & Purchasing**

**ROOM 203AB**

**Effect of Sr-P Interaction on the Performance of A413 Type Alloys (17-086)**

*Agnes M. Samuel, Fawzy Samuel, Université du Québec à Chicoutimi (UQAC) (Chicoutimi, Quebec, Canada); Herbert Doty, General Motors (Pontiac, Michigan); Salvador Valtierra Gallardo, Nemak S.A. (Garza Garcia, Mexico)*

A study was carried out to investigate the possible interaction between Sr and P and its consequent effect on the microstructure and tensile properties of A413.0 type alloys. The results show that depending on the Sr content, over-modification results in precipitation of Al<sub>2</sub>SrSi<sub>2</sub> over a wide temperature range, in pre-eutectic, co-eutectic and post-eutectic reactions.

**Categories: Nonferrous, Engineering & Technology**

**Process Window Optimization for High Pressure Diecasting (17-077)**

*Max Gondek, MAGMA Foundry Technologies, Inc. (Schaumburg, Illinois); Bing Fung, FCA Group (Etobicoke, Ontario, Canada)*

Through process variation there is a probability of creating casting defects and undesirable conditions. In order to properly prepare for these variations, the casting system should be simulated with variation in the process parameters. This presentation provides an example of how to develop a process window for a given casting in order to quantitatively allow for maximums and minimums in the process. This information then can be utilized in the production of the casting.

**Categories: Molding, Engineering & Technology, Nonferrous**

**Developing Heat Transfer Coefficients for Aluminum Permanent Mold-Casting Interfaces With the Use of Inverse Optimization Methodology (17-107)**

*Matheus Oliveira, MAGMA Foundry Technologies Inc. (Schaumburg, Illinois); Henry Renegar, Suresh Govindaswamy, Pavel Kovalenko, Miguel Sanchez-Araiza, Superior Industries (Fayetteville, Arkansas)*

Foundries depend on simulation technology to shorten their lead time without compromising quality. One of the largest unknown variables present in permanent mold processes is the heat transfer coefficient, which describes how and to what extent heat is transferred from casting into the mold. Autonomous optimization into simulation is a new tool for obtaining the heat transfer coefficient and understanding what variables are influencing the outcome of the results.

**Categories: Nonferrous, Molding, Engineering & Technology**

**ROOM 202C**

**Panel: Defect Remedy Conclave (17-116)**

*Marc King, Globe Metallurgical Inc. (LaPorte, Indiana); Jim Headington, Dotson Iron Castings (Mankato, Minnesota); Josh Keller, Bremen Iron Castings (Bremen, Indiana); David Hughes, US Pipe & Foundry Co. (Bessemer, Alabama); Scott Sharpee, Hypro Inc. (Waterford, Wisconsin); Andy Adams, Foseco (Cleveland)*

What defect are you fighting today? Is it caused by a chemistry change in the charge materials? Is it related to a deviation in the melting procedure? Has the sand system gone out of adjustment? Have the alloys been added properly and the molds poured correctly? A panel of operating metalcasters will present defects from their foundry. They will explain the examination that was required to determine the true source of the defect. The final solution will be illustrated. If you have a question about a certain defect bring it to the panel presentation and we will discuss it, if there is time available at the end.

**Categories: Engineering & Technology, Ferrous, Casting Design & Purchasing**

**ROOM 202DE**

**Panel: Improving Pressure Pour Furnace Operations (17-137)**

*Brian Harmon, John Deere Foundry (Waterloo, Iowa); Ben Froelich, Aarrowcast Inc. (Shawano, Wisconsin); Craig Sederholm, Rochester Metal Products Corp. (Rochester, Indiana); John Walsh, Saint Gobain Ceramics (Worcester, Massachusetts); Jerry Holcombe, Robert Pattillo, Reno Refractories Inc. (Morris, Alabama)*

This panel discussion will discuss how three



different foundries accomplish routine cleaning of their pressure-pour furnaces and what operational procedures are done daily and weekly. They will share what changes should be made when challenged with build-up and how to move forward with a cleaning maintenance program. A review of refractories used in pressure pour furnaces, from the inductor, uppercases and spout refractories, also will be discussed.

**Categories: Ferrous**

### **ROOM 202AB**

#### **Silver Anniversary Lecture: Review of Cast Iron Metal Penetration Defects (17-126)**

*Scott Giese, University of Northern Iowa (Cedar Falls, Iowa)*

**Tags: Molding, Ferrous, Casting Design & Purchasing**

#### **Golden Anniversary Lecture: Effect of Mold-Steel Interface Reactions on Casting Surfaces (17-089)**

*Rod Naro, ASI International Ltd. (Cleveland)*

This Golden Anniversary paper will update both the original research work published in 1967 as well as the updated 1992 Silver Anniversary paper on mold-steel interface reactions on steel casting surfaces. It will review both published and unpublished research over the past 50 years and focus on advances in mold and coremaking technologies and correlate how they influence casting surface quality.

**Categories: Molding, Ferrous, Casting Design & Purchasing**

## **Wednesday, April 26**

**8-9 a.m.**

### **ROOM 202C**

#### **Panel: Slag Analysis: Is It Worth the Effort for Your Foundry? (17-112)**

*Pete Satre, Allied Mineral Products Inc. (Columbus, Ohio); Matt LaFramboise, Auburn Analytical Labs Inc. (Midland, Michigan); Dan Weiskopf, Neenah Foundry Co. (Neenah, Wisconsin)*

Analysis personnel, refractory personnel and foundry users will discuss the pros and cons, as well as practical use, of slag analysis in a foundry.

**Categories: Ferrous, Business of Metalcasting, Casting Design & Purchasing**

### **ROOM 203AB**

#### **Panel: Best Practices for Cooling Tower Maintenance, Operations and Savings (17-143)**

*Brian Reinke, TDI Energy Solutions (Lemont, Illinois); Lance Rock, United Building & Energy Services (Wheaton, Illinois); Susan Hunter, EMSCO Inc. (Massillon, Ohio)*

Induction furnaces are usually cooled by water flowing through the furnaces' coils, which are made of heavy copper tubing. These coils capture huge amounts of heat, principally from the enormous electrical currents flowing through the furnaces. Cooling towers are an integral part of the cooling system, removing the heat and sending cooler water back to the furnace. Yet these essential devices are often overlooked as potential opportunities for more efficient operation and reduced expenses. Come learn how to improve the efficiency of these devices to improve your operational throughput and reduce costs.

**Categories: Engineering & Technology, Ferrous, Nonferrous**

### **ROOM 202DE**

#### **Panel: Silica—What You Should Be Doing Now (17-111)**

*Tom Slavin, Slavin OSH Group LLC (Chicago); Bob Scholz, TRC Companies Inc. (Brookfield, Wisconsin); Kay Rowntree, Industrial Hygiene Sciences LLC (Waterford, Wisconsin); Jeet Radia, McWane Inc. (Birmingham, Alabama); Eric Pylkas, Stantec (Mequon, Wisconsin)*

With the silica provisions to take full effect in June 2018, this session will discuss where foundries need to be and what they should be doing now to be in compliance. Several health, safety and compliance experts will be available to help answer questions that have come up now that foundries have started to grapple with the new standard and its challenges.

**Categories: Environmental Health & Safety, Molding, Business of Metalcasting**

### **ROOM 202AB**

#### **Panel: Additive Manufacturing for Metalcasting (17-123)**

*Brandon Lamoncha, Humtown Products (Columbiana, Ohio); Travis Frush, Jerry Thiel, University of Northern Iowa (Cedar Falls, Iowa); Rich Lonardo, Youngstown Business Incubator (Youngstown, Ohio)*

New manufacturing methods are being developed every year and opportunities for adoption ever increasing. The group

Wednesday, April 26 (Continued)

will discuss the current state of technology, emerging technologies and opportunities for competitive advantages through industry adoption.

**Categories: Engineering & Technology, Casting Design & Purchasing, Molding**

### **ROOM 203C**

#### **Application of Fracture Mechanics in the Design of Low-Alloy Steel Castings for Heavy Mobile Equipment (17-035)**

*Patrick Severson, Rani El-Hajjar, Pradeep Rohatgi, University of Wisconsin-Milwaukee (Milwaukee); Hathibelagal Roshan, Maynard Steel Casting Co. (Milwaukee)*

Low-alloy steel castings are important components in structures for heavy mobile equipment. Typically, cast components are analyzed by determining the mean stress, stress range and von Mises stress. Using these stresses, an engineer can determine fatigue life using the Modified Goodman approach, along with determining adequate safety factors for strength and fatigue. Fracture mechanics properties of a typical low-alloy steel and its application in the design of castings will be discussed.

**Categories: Ferrous, Casting Design & Purchasing, Engineering & Technology, Business of Metalcasting**

#### **Invention of Variable Density Lightweight Steel Castings for Army, Naval and Civilian Applications (17-036)**

*Hathibelagal Roshan, Maynard Steel Casting Co. (Milwaukee)*

The ability to absorb energy of impact or blast is crucial to the design of army and navy structures. Metallic foams possess low density, energy absorption and vibration damping capabilities. At Maynard Steel, inventive developments of steel foam have been made that result in lower weight compared to solid steel. U.S. and international patent applications are pending for these developments. The intent of this presentation is to bring awareness to defense and civilian engineers and designers regarding the availability of this new material for applications.

**Categories: Ferrous, Engineering & Technology, Casting Design & Purchasing, Business of Metalcasting**

**8-11:30 a.m.**

### **ROOM 203D**

#### **AFS Institute Course: Virtual Casting Process**

*Dave Charbauski, Consultant (Sugar Grove, Illinois)*

This course will provide a basic overview of the metalcasting process. It will trace the path of a casting from quoting through shipping.

**Categories: Professional Development, Business of Metalcasting, Casting Design & Purchasing**

**9:15-10:15 a.m.**

### **ROOM 202DE**

#### **Development and Casting of High Cerium Content Aluminum Alloys (17-013)**

*David Weiss, Eck Industries, Inc. (Manitowoc, Wisconsin)*

This session will describe the development and castability of near eutectic aluminum-cerium alloy systems. The castability ranking of the binary systems is as good as or better than the aluminum-silicon system with some deterioration as additional alloying elements are added. Production systems for melting, de-gassing and other processing of aluminum-silicon or aluminum-copper alloys can be used without modification for conventional casting of aluminum-cerium alloys.

**Categories: Nonferrous, Engineering & Technology, Casting Design & Purchasing**

#### **Effect of Wall Thickness and Manganese Additions on the Formation of Intermetallic Iron Phases in New Secondary Alloys Suitable for Vacuum Assisted HPDC (17-024)**

*Andrea Niklas, Rodolfo González-Martínez, Sergio Orden, Asier Bakedano, Michel Garat, Ana Fernández-Calvo, IK4-AZTERLAN (Durango, Spain)*

In this study, the influence of cooling rate and manganese additions on the formation of intermetallic iron phases in an AlSi10MnMg(Fe) secondary aluminum alloy has been investigated. The aim was to substitute the conventional AlSi10MnMg primary alloy by a less expensive secondary alloy with comparable mechanical properties by substituting the harmful beta phases by alpha phases.

**Categories: Nonferrous**

## **ROOM 202C**

### **Honorary Lecture: Survival in a Brave New World of Metalcasting (17-132)**

*Kyle Metzloff, University of Wisconsin-Platteville (Platteville, Wisconsin)*

Will your foundry be around in 20 years? What is the difference between a growing and dying foundry? What are the common themes in people, processes, technological innovation and adaptation that are keeping the top foundries relevant?

**Categories: Business of Metalcasting, Casting Design & Purchasing, Ferrous**

## **ROOM 203AB**

### **Arc Flash for Foundries (17-144)**

*Curtis Latzo, Latzo Industries (Madeira, Florida)*

This presentation will cover arc flash hazards, personal protective equipment when working on or near energized equipment, electric safety principles, and OSHA Chapter 29 and NFPA 70E regulations.

**Categories: Environmental Health & Safety, Ferrous**

## **ROOM 203C**

### **Assessing the Root Cause of Foundry Injuries (17-069)**

*Ted Schorn, Enkei America Inc. (Columbus, Indiana)*

Since the publication of Heinrich's "Industrial Accident Prevention: A Scientific Approach" in 1931 (first edition) it has been common to assign responsibility for a greater part of industrial injuries to the unsafe acts of employees. Indeed, many modern safety professionals often estimate 80% or more of all injuries are the result of unsafe acts and only 20% or less result from unsafe conditions. This session will argue unsafe acts are seldom, if ever, the root cause of industrial injuries and the belief injuries derive fundamentally out of employee attitude is the result of a flawed view of human behavior, poor root cause analysis and a defective view of the responsibility borne by manufacturers. Potential underlying causes to unsafe behavior will be provided to assist better root cause analysis.

**Categories: Environmental Health & Safety, Business of Metalcasting, Engineering & Technology**

## **ROOM 202AB**

### **Panel: Green Sand System Control: A Foundry Perspective (17-147)**

*Brian Rachwitz, EJ (East Jordan, Michigan); Jay Zins, Dotson Iron Castings (Mankato, Minnesota); Godfrey Sergeant, Grede-New Castle (New Castle, Indiana); Abhishek Pathak, Textron Inc. (Muskegon, Michigan)*

Four foundry leaders will discuss their experiences in green sand system control in the iron foundry. Topics will include a global perspective, how changes to muller settings affect sand properties, interpreting sand test results, and an evaluation of scrap castings using sand data.

**Categories: Molding, Business of Metalcasting**

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**1:30-3 p.m.**

## **ROOM 203D**

### **AFS Institute Course: Building Positive Buzz: Intentionally Shaping Your Reputation Through Emotional Intelligence**

*Dr. Carol Grannis, Cindy Maher, Leading Edge Coaching & Development (Woodbury, Minnesota)*

Leading Edge founders Carol Grannis and Cindy Maher will spark reflection, discussion, and commitment in an interactive workshop. Through a mix of improvisational comedy, cutting edge research, and peer learning, you will walk away with a greater awareness of the reputation you have and a roadmap that will lead to the legacy and reputation you want.

**Categories: Professional Development, Business of Metalcasting**

## **ROOM 202DE**

### **Comparing the Mechanical Properties Inside the Same Cast Frame Produced in Alloy A356-T6 and in Alloy 206-T6 (17-015)**

*Franco Chiesa, David Levasseur, Gheorghe Marin, Quebec Metallurgy Center (Trois-Rivières, Quebec, Canada); Bernard Duchesne, Collège de Trois-Rivières, (Trois-Rivières, Quebec, Canada)*

An industrial casting weighing 31 lbs. was poured, first in aluminum A356 (AlSi7Mg03), then in aluminum 206 (AlCu4). ASTM E7 sub-size tensile specimens were excised from the castings and pulled in the T6 condition for alloy A356 and in the T4 condition for alloy 206. Six regions of the casting were investigated, and the results will be shared in this presentation.

**Categories: Nonferrous, Casting Design & Purchasing**

Wednesday, April 26 (Continued)

### **Effect of Weld Repair on Static and Dynamic Properties of A206-T4 and A206-T71 Sand Castings (17-092)**

*Gerald Gegel, Material and Process Consultancy (Morton, Illinois); David Weiss, Eck Industries Inc. (Manitowoc, Wisconsin)*

AMS 26994A, the material specification for A206 sand castings, requires the filler metal used for weld repair shall be of the same nominal chemical composition as the casting. However, most of the industry, with client approval, use 2319 weld wire. This study has determined, with proper establishment of process parameters, either 206 alloy or 2319 alloy may be used to successfully repair weld A206 sand castings. The results of tensile and fatigue testing will be used to compare the properties of repair welded and non-welded sand cast materials.

**Categories: Nonferrous, Casting Design & Purchasing**

### **ROOM 202C**

#### **Evaluating Iron Filter Print Designs, 30 Years Later (17-027)**

*Brian Dickinson, Tony Midea, Andy Adams, Foseco (Cleveland)*

This presentation will couple the most advanced fluid flow technology and recent foundry experience to assess filter print designs and recommend best application techniques and methodology to the iron foundry industry. This initial work focuses on analyses and evaluation of numerous concepts using sophisticated, first principle fluid flow analysis by employing industry standard casting process simulation software.

**Categories: Ferrous, Engineering & Technology**

#### **Minimizing Casting Costs by Autonomously Simulating Different Gating Systems for Ductile Iron Castings (17-047)**

*Daniel Coyle, MAGMA Foundry Technologies, Inc. (Schaumburg, Illinois)*

This presentation will show two examples where casting simulation software was used to calculate manufacturing costs for many different gating system configurations and the lowest casting price was autonomously realized.

**Categories: Ferrous, Casting Design & Purchasing, Engineering & Technology**

### **Process Essentials of Combining Powder Metallurgical Inserts With Gray Iron (17-072)**

*Lennart Elmquist, Swerea SWECAST AB (Jonkoping, Sweden)*

Multi-material components offer the advantages of elevated local properties with more economical substrates. In this work we have evaluated the process essentials of integrating powder metallurgical inserts in gray iron. In the discussion, the potential applications for the proposed technology will be presented.

**Categories: Ferrous, Engineering & Technology, Casting Design & Purchasing**

### **ROOM 203AB**

#### **Panel: Metal Casting Perspectives on ISO 9001:201 (17-118)**

*Ron Spencer, Rochester Metals Products Corp. (Rochester, Indiana); Ted Schorn, Enkei America Inc. (Columbus, Indiana)*

This panel will examine the significant changes with this new standard and their impact on metal casters. Transition strategies and audit impact will be discussed.

**Categories: Business of Metalcasting, Engineering & Technology**

### **ROOM 202AB**

#### **Panel: EHS Hot Topics (17-108)**

*Jeet Radia, McWane Inc. (Birmingham, Alabama); Mark Remlinger, Matthews International Corp. (Pittsburg); Tom Slavin, Slavin OSH Group LLC (Chicago); Jeff Hannapel, The Policy Group (Rockville, Maryland); Stephanie Salmon, Potomac Government Relations (Washington, DC)*

The panel will give an update on activities in the areas of air, water and waste topics, along with safety and health topics that affect metalcasters.

**Categories: Environmental Health & Safety, Business of Metalcasting**



**3:15-4:45 p.m.**

### **ROOM 202DE**

#### **Introduction and Experiences in SMARTT Degassing (17-012)**

*Brian Began, Foseco (Cleveland); Ronny Simon, Foseco GmbH (Borken, Germany)*

This presentation will discuss hydrogen removal in cast aluminum alloys, covering the variables, the measurement and a model for improving rotary degassing. It also discusses efforts to integrate a developed rotary degassing model into a metal treatment station used at a production facility.

**Categories: Nonferrous, Casting Design & Purchasing**

#### **I Have Inclusions. Get Me the Cheapest and Best Flux for Cleaning My Melt—Is This the Best Driven Cost Saving Approach by a Foundry? (17-106)**

*Rafael Gallo, Pyrotek Inc. (Aurora, Ohio)*

The elimination of inclusion defects requires proper collection and analysis of data. Attempting a corrective action without knowing exactly what the inclusion is may prove very expensive. Unfortunately, it is not uncommon practice to inaccurately identify an inclusion based on educated guesses, erroneously avoid paying for the cost of properly diagnosing the inclusion, inaccurately correlate the effects of all the molten metal and casting process contributing factors, and incorrectly blame the melting department for producing and delivering “bad metal.” This session will provide a guideline to better understand the interrelated aspects to define molten metal quality.

**Categories: Nonferrous, Casting Design & Purchasing**

### **ROOM 202C**

#### **Panel: The Skin I Am in—Effect and Control of Gray Iron Skin on Ductile Iron and Compacted Graphite Iron Castings (17-117)**

*Charles Monroe, University of Alabama at Birmingham (Birmingham, Alabama); Brandon Reneau, Caterpillar Inc. (Mapleton, Illinois); David Gilson, SinterCast Inc. (Naperville, Illinois); Mark Osborne, American Castings LLC (Pryor, Oklahoma)*

Gray iron skin on ductile and compacted graphite iron castings has become a bigger issue for casting performance as designers get closer to design limits. Panel presenters will discuss the effect of skin

on performance, how to control skin in the casting process, and case histories of specific parts. Information presented can be used in your respective foundry to be aware of detrimental effects of skin and potential controls on the shop floor.

**Categories: Ferrous, Casting Design & Purchasing**

### **ROOM 203AB**

#### **A New Approach to Process Control and Traceability in the Cast Iron Foundry Industry (17-113)**

*Tom Schroeder, SinterCast Inc. (Naperville, Illinois); Patrik Popelar, Arnaud Denis, Johan Antonsson, SinterCast AB (Katrineholm, Sweden); Fabio Pena Rios, Lidya Aguilar, Hector Villicana, Tupy (Saltillo, Mexico); Daryl Self, Ford Motor Co. (Dearborn, Michigan)*

A North American foundry installed advanced process control technology for the start of a new, high volume compacted graphite iron (CGI) gasoline engine cylinder block, which is now the highest volume CGI engine in the world. The foundry also became the first casting plant to install a novel ladle tracking system that automatically tracks and logs the time and location of every ladle at every step in the process, from furnace tapping through all metal treatments and pouring.

**Categories: Ferrous, Business of Metalcasting**

#### **Integrated Computational Materials Engineering (ICME) Tools for High Performance Cast AI Component Development (17-017)**

*Qigui Wang, Yucong Wang, Dale Gerard, General Motors (Pontiac, Michigan); Peggy Jones, General Motors (Saginaw, Michigan)*

Shape casting is complex and often involves competing mechanisms, multi-physics phenomena, and potentially large uncertainties. This session reviews the latest development and applications of integrated computational materials engineering tools for high performance aluminum shape casting, from casting design through microstructure control to mechanical properties.

**Categories: Nonferrous, Engineering & Technology, Casting Design & Purchasing**

### **ROOM 202AB**

#### **3DPS Feature Generation in the YZ & XY Planes (17-070)**

*Kip Woods, University of Northern Iowa (Cedar Falls, Iowa)*

The University of Northern Iowa conducted

## Wednesday, April 26 (Continued)

several trials on printed test geometry to better understand the feature generation capabilities of 3-D sand printers, and the results of the study will be shared in this presentation.

**Categories: Molding, Casting Design & Purchasing, Engineering & Technology**

### Critical Characteristics Affecting the Surface Finish of Castings (17-094)

*Nathaniel Bryant, Jerry Thiel, University of Northern Iowa (Cedar Falls, Iowa)*

The University of Northern Iowa has been investigating mold material characteristics that affect surface smoothness for castings. The research was conducted on aluminum castings but has applications and relevance in ferrous alloys that don't exhibit defects such as penetration or fused sand defects. The goal of the project was to accomplish investment casting surface finishes in sand cast parts.

**Categories: Molding, Nonferrous**

### ROOM 203C

#### Effects of Heat Treatment and Thermal Exposure on the Microstructures and Mechanical Properties of Cast Ferritic Stainless Steel CB30 (17-042)

*Delin Li, CanmetMATERIALS, Natural Resources Canada (Hamilton, Ontario, Canada); Tim McGreevy, Dong Wei, Michael Pollard, Caterpillar Inc. (Peoria, Illinois)*

Alloy CB30 of 19% chromium in ASTM A743 standard specification is a borderline ferritic stainless steel in which the elements can be balanced to produce a ferritic structure or some martensite containing dispersed chromium carbides. This work was done to optimize the standard alloy CB30 and mainly study the effects of heat treatment and thermal exposure.

**Categories: Ferrous, Casting Design & Purchasing, Engineering & Technology**

## Thursday, April 27

**8-9 a.m.**

### ROOM 202DE

#### Silver Anniversary Paper: Molten Metal Cleanliness: 25 Years in Review—The Technological Advancements and Foundry Practices (17-105)

*Rafael Gallo, Pyrotek Inc., (Aurora, Ohio)*

Despite the wide range of melting furnaces employed by the foundry industry to prepare

liquid aluminum for castings, all foundries have three common technological needs: strategies to deal with hydrogen absorption, techniques to control chemical impurities, and methods for monitoring, controlling, and improving the quality of the molten bath. The technological advancement for the last 25 years on molten metal processing will be related to current foundry floor practices to expose areas of opportunity for foundries to improve their theoretical and practical knowledge of the melting process.

**Category: Nonferrous**

### ROOM 203AB

#### Panel: The Role of Social Media in the Foundry Industry (17-146)

*Wendy Pilcher, MAGMA Foundry Technologies Inc. (Schaumburg, Illinois); Dana Cooper, Cooper Hayes LLC (Stevensville, Michigan)*

More than 50% of American adults use multiple social media platforms. Social media is a powerful opportunity to build company branding and help organizations "be found" when individuals are researching an organization or its goods and services. Learn how an effective social media strategy can increase brand awareness, generate sales leads, improve customer service and provide efficiency with the number of prospects/candidates reached at a lower cost and faster rate.

**Category: Business of Metalcasting**

### ROOM 202AB

#### Process Simulation and Experimental Validation of Resin-Bonded Silica Sand Mold Casting (17-002)

*Yan Lu, Huimin Wang, The Ohio State University (Columbus, Ohio); Keith Ripplinger, Honda Engineering North America, Inc. (Anna, Ohio); Alan Luo, The Ohio State University (Columbus, Ohio)*

A commercial resin-bonded silica sand mixture was studied through both experiments and simulation. Mechanical tests, including three point bending test and uniaxial tensile test, were employed to study the mechanical behaviors of the sand. The casting process was simulated using finite element analysis (FEA). Laboratory gravity casting experiments were carried out to validate the simulation results. The methods and results provide valuable information on sand properties and a material model for casting process simulation.

**Categories: Molding, Engineering & Technology, Nonferrous**

## **ROOM 202AB**

### **Prediction of Core Gas Pressure From Chemically-Bonded Sand Molds Using Process Simulation Software (17-097)**

*Sairam Ravi, Jerry Thiel, University of Northern Iowa (Cedar Falls, Iowa)*

The University of Northern Iowa completed the first stage of developing an advanced applied programming interface software code to predict gas porosity defects based on mold and core material property data. The code is based on the replacement of the testing methodology for gas pressure and volume with current thermogravimetric analysis technology. The new testing methodology is more accurate and repeatable and offers temperature-dependent results. The presentation will detail the research conducted with phenolic urethane resin used on aluminum castings.

**Categories: Molding, Engineering & Technology, Nonferrous**

### **Steel Gating System Design: Developing a Quantitative Measure of Gating System Performance (17-025)**

*Roy Stevenson, Gerald Richard, MAGMA Foundry Technologies Inc. (Schaumburg, Illinois)*

A new methodology of using casting process simulation in conjunction with user defined numerical objectives will be introduced for assessing the performance of a given gating system. Two case studies on a 60,000-lb. casting and a 60-lb., casting will be presented.

**Categories: Ferrous, Engineering & Technology**

### **Controlling Nitrogen Pick-Up During Induction Melting Low Alloy Steels (17-058)**

*Mingzhi Xu, Daniel Field, Jingjing Qing, Viraj Athavale, David Van Aken, Missouri University of Science & Technology (Rolla, Missouri)*

During the solidification of the steel, nitrogen in the solution will form blowholes or precipitate as nitrides. The Missouri University of Science and Technology research foundry encountered significant nitrogen pick-up when melting C-Si-Mn-Ni-Cr-Mo-V steel. Several efforts were made to control the nitrogen absorption during the melting, including acquiring low nitrogen charge materials, adjusting materials charging order, providing enough inert gas covering and adding surface-active elements. After optimizing the induction melting procedure, final nitrogen content in the steel castings was decreased from 200 to 80 ppm.

**Categories: Ferrous**

**9:15-10:15 a.m.**

## **ROOM 202DE**

### **Modeling and Experimental Characterization of the Deformation of PUCB Sand Cores During Casting (17-068)**

*Hiba Bargaoui, Farida Azzouz, and Georges Cailletaud, Mines ParisTech, PSL Research University (Evry, France); Delphine Thibault, Montupet (Laignevill, France)*

Understanding core deformation would allow significant savings on development costs in corebox design and the full casting process. In this session, a new insight into core deformation will be given. A specific model involving resin aging and damage development is being developed to represent the deformation as a function of load and temperature history.

**Categories: Casting Design & Purchasing, Molding, Engineering & Technology**

### **Effect of Alloying Elements on the Performance of 354-Type Alloys (17-090)**

*Guillermo Garza-Elizondo, Agnes M. Samuel, Fawzy Samuel, Université du Québec à Chicoutimi (Chicoutimi, Quebec, Canada); Hany Ammar, Suez University (Suez, Egypt); Salvador Valtierra Gallardo, Nemak, S.A. (Garza Garcia, Mexico)*

In this study, the effects of Ni, Mn, Zr, and Sc additions, individually or in combination with other additives, on the microstructure and tensile properties of 354 casting alloy (Al-9wt%Si-1.8wt%Cu-0.5wt%Mg) were investigated.

**Categories: Nonferrous, Casting Design & Purchasing**

## **ROOM 202AB**

### **Panel: Aligning Metalcaster's Quality Management Systems With Sustainability (17-141)**

*Ted Schorn, Enkei America Inc. (Columbus, Indiana); Dana Cooper, Cooper Hayes LLC (Stevensville, Michigan)*

This session supports the contention that well known quality methods and tools can be used to achieve sustainability management: that good management works to produce sustainability performance as well as it does for quality or customer satisfaction. We will demonstrate how metalcasters can use quality management system learnings to advance sustainability efforts. Existing ISO standards also provide linkages between good management practices and sustainability.

**Categories: Business of Metalcasting, Engineering & Technology**

Thursday, April 27 (Continued)

### **ROOM 203AB**

#### **Effectively Communicating with Millennials (17-149)**

*Mackenzie Meekhof, Denison Industries Inc. (Denison, Texas)*

How can you integrate young, technology-driven talent into your foundry? The first step is learning how we think, how we approach problems and our expectations. The second step is learning how to bridge the differences between your millennials, gen Xers, and boomers.

**Categories: Business of Metalcasting, Professional Development**

### **ROOM 202C**

#### **Evaluation of Molten Steel-Refractory Interactions in High Manganese and Aluminum Steels During Transfer Operations (17-079)**

*Riazur Rahman, Texas State University (San Marcos, Texas); Laura Bartlett, Missouri University of Science and Technology (Rolla, Missouri)*

The current study evaluates steel-refractory interactions in a nominal composition Fe-30%Mn-9%Al-0.75%Si-0.9%C-0.5%Mo steel during ladling operations when there is shorter residence time for the steel to be in contact with the refractory. Results showed that when the phosphate refractory was used to coat the ladles, this resulted in only a slight increase in phosphorus however; Si increased from 0.74 to 0.97% and carbon increased slightly from 1.06 to 1.13%.

**Categories: Ferrous**

#### **Effect of Austenite Fraction on Rare Earth Grain Refinement (17-083)**

*Robert Tuttle, Saginaw Valley State University (University Center, Michigan)*

Several different rare earth oxides can form. Most are excellent nuclei for austenite, but not ferrite. Plain carbon steels solidify by initially forming ferrite and then forming austenite through the peritectic reaction. Once austenite formation starts, the rare earth oxides which had not been a good fit for ferrite could nucleate austenite. To examine how the austenite fraction during solidification effects grain refinement response, a series of plate casting experiments were conducted. Additions of rare earth silicide were made to form rare earth oxides. Grain refining response improved with an increase in austenite fraction during solidification.

**Categories: Ferrous, Casting Design & Purchasing**

**10:30-11:30 a.m.**

### **BALLROOM A**

#### **Hoyt Memorial Lecture: The Power of and Need for Research in Metalcasting (17-148)**

*Doug Trinowski, HA International LLC (Westmont, Illinois)*

Past metalcasting research has led to measurable improvements in the industry. It focuses on the need for continued research as supported by AFS, along with several examples of critical needs and challenges in the industry that can only be resolved through organized research. This lecture will compare and contrast how research is conducted in other countries, primarily the European Union. Finally, the need for improving the technical transfer process, taking fundamental research and commercializing it to improve the competitiveness and sustainability of the North American metalcasting community will be discussed.

### **AFS Silica Exposure Control Workshop**

**Thursday, April 27 • 1-4:30 p.m. • Room 203C**

AFS is holding a special free workshop on silica after Metalcasting Congress. Register at [www.afsinc.org](http://www.afsinc.org).

Foundries must begin actively planning their compliance strategy to be ready for the new regulations on respirable silica.

This workshop will focus on controlling silica exposure levels in the foundry, including equipment and procedures associated with the sand system process operation and maintenance, material handling, ventilation and housekeeping. The workshop will feature case studies and foundry experiences in controlling silica exposure hazards.

## **SHOW APP**

The Metalcasting Congress app gives exhibitors and attendees a way to plan out their day, take notes, and make schedule adjustments on the fly. Find it in your mobile device's app store.





# LODGING & TRAVEL

AFS has secured rates between \$114-\$169 per night for room blocks at several hotels. The main host hotel is the Hilton Milwaukee City Center.

Attendees can receive airfare discounts on Delta and United.

Go to [www.metalcastingcongress.org](http://www.metalcastingcongress.org) for a full program of technical, management and educational sessions, a list of exhibitors, and housing and airline details.

## Tax Deduction of Expenses

An income tax deduction is allowed for expenses of education, including registration fee, travel, meals and lodging, undertaken to maintain and improve professional skills (see U.S. Treasury Regulation 1-162.5).

## Contact Us

If you have any questions regarding the registration process, please call Metalcasting Congress Registration at 224-563-3770 or e-mail [metalcasting@compusystems.com](mailto:metalcasting@compusystems.com). If you have any questions about the event, please call AFS at 847-824-0181.

# MILWAUKEE: A HOME TO INDUSTRY & CULTURE

Located on the scenic shore of Lake Michigan, Milwaukee offers a blend of stunning natural beauty, big city arts and entertainment and Midwest charm. It is a city of colorful, walk-around neighborhoods, an acclaimed culinary scene and entrepreneurial spirit.

The Wisconsin Center is connected via Skywalks to Hilton and Hyatt hotels and it's walking distance to the Milwaukee Public Museum, Humphrey I-Max Theater, Riverwalk, Theater District and the Grohmann Museum, which features the Eckhart G. Grohmann Collection "Man at Work." This collection features paintings and sculptures of trade and industry, including a significant amount of artwork depicting metalcasting.



Metalcasting-themed art is on display at Grohmann Museum.

# FEATURED EXHIBITORS

**ABP**  
INDUCTION

 **Fairmount Santrol**  
Integrated Sand and Resin Solutions

 **SIMPSON**  
TECHNOLOGIES

 **ACC**  
AMERICAN COLLOID COMPANY

**GENERAL**  
 **KINEMATICS**

  
**sinto**

 **Customized**  
Energy Solutions

 **INDUCTOTHERM**

**TINKER**  **OMEGA**  
MANUFACTURING LLC

 **ExOne**  
DIGITAL PART MATERIALIZATION

  
**LAEMPE**

 **VULCAN**  
ENGINEERING CO.

# SUPPLIER EXHIBITORS (as of February 15)

Visit the show floor to connect with companies that help solve your problems and improve your bottom line. Don't forget to swing by for a reception on the show floor on Wednesday, April 26 from 4:30-6 p.m.

## A

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ABP Induction LLC  
Ajax TOCCO Magnethermic  
ALCOA  
Allied Mineral Products  
American Colloid Co.  
AMETEK Foundry Products  
Anderson Global  
AnyCasting Software Co. Ltd.  
Applied Process Inc.  
ASCO Carbon Dioxide Inc.  
ASK Chemicals  
ATD Engineering & Machine  
ATS Applied Tech Systems

## B

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B&L Information Systems  
Badger Mining Corp.  
Blast Cleaning Technologies  
BROKK Inc.  
Bruker Corporation

## C

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Can-Eng Furnaces  
International Ltd.  
Capital Refractories  
CARBO Industrial Technologies  
Carpenter Brothers Inc.  
Carrier Vibrating Equipment Inc.  
CMH MFG  
Continental Aluminum  
Customized Energy Solutions  
Ltd.

## D

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D & E Ladles  
Didion International Inc.  
DISA Industries  
Diversified Pattern &  
Engineering  
Ductile Iron Society

## E

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EC&S and KW  
EKK, Inc.  
Elkem Foundry Products  
Empire Systems Inc.  
EMSCO, Inc.  
Engis Corporation  
Equipment Manufacturers  
Int'l. (EMI)  
ERIEZ  
ESI North America  
ETA Engineering Inc.  
Exact Metrology Inc.  
ExOne  
EZG Manufacturing

## F

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Fairmount Santrol  
FATA Aluminum LLC  
Finite Solutions Inc  
Flexovit USA, Inc.  
Flow Science  
Foseco  
Foundry Solutions & Design

## G

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Gauss/Italpresse of America  
General Kinematics  
Gentex Corporation/Pureflo  
Goff Inc.  
Gradient Lens Corporation  
Gradmatic Equipment Inc.  
Green Diamond Sand Products  
Green Packaging Inc.  
GreenSand Controls  
Guardian Software Systems

## H

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HA International  
Heraeus Electro Nite  
Herschel Products

Hickman, Williams & Company  
High Temperature Systems, Inc.  
Hill & Griffith  
Hi-Vac Corporation  
Hoosier Pattern  
Houghton International  
Humtown Products  
Hunter Foundry Machinery Corp

## I

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Imerys Metalcasting Solutions  
Inductotherm Corp  
Industrial Associates  
Innovative Analytical Solutions  
LLC

## J

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J. B. DeVENNE INC.  
Jingang New Materials Co., Ltd.  
Joymark

## K

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Keramida Inc.  
Kittyhawk Products  
Kodiak Group  
Kuttner LLC

## L

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LaempeReich Corporation  
Lawjack Wear Products Inc.  
LECO Corporation  
Lindberg/MPH

## M

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Magaldi Technologies LLC  
MAGMA Foundry Technologies,  
Inc.  
Matrix Sensors, LLC  
MeltLab Systems  
Michigan Pneumatic Tool, Inc.  
Mono Ceramics  
Morgan Advanced Materials

**N**

NorthStar Blast Solutions  
(Alliant Castings)  
Norton / Saint Gobain  
NovaCast USA Inc.  
Nutec Bickley

**O**

OmniSource Corp.  
Otto Power (Otto Junker)

**P**

Palmer Manufacturing and  
Supply  
Palmer Maus North America  
Perfect Patterns  
Peter E Macler Associates,  
PLLC  
Pillar Induction  
Prince International  
Corporation

**Q**

Q. C. Designs, Inc.  
Quintus Technologies

**R**

REFCOTEC, Inc.  
Refractory & Insulation Supply,  
Inc.  
Refractory Service, Inc.

Rex Heat Treat  
Roberts Sinto Corporation

**S**

Saint-Gobain Ceramics  
Saveway USA  
Schust  
Shengquan Group Share-  
Holding Co.  
Simpson Technologies  
Solex Thermal Science Inc.  
solidThinking  
Southeasten Foundry Products  
& Foundry Coatings, Inc.  
SPECTRO Analytical  
Instruments  
Stotek, Inc.  
StrikoWestofen America  
Summit Foundry Systems, Inc.  
Superior Graphite  
Synchro ERP Ltd.  
SYSCON Sensors

**T**

The Modal Shop  
The Schaefer Group, Inc.  
The TDJ Group, Inc.  
Thermbond Refractory  
Solutions  
Thermo Fisher Scientific

Thermtronix Corporation  
THORS eLearning Solutions  
Tinker Omega Mfg LLC  
Top Cat Air Tools  
Transmet Corporation

**U**

U-Metco Inc.  
Unimin Corp  
United Refractories Company

**V**

VCI2000  
Verder Scientific, Inc  
Versevo Inc.  
Viking Technologies, Inc.  
voxeljet America Inc.  
Vulcan Engineering Co.

**W**

Westmoreland Advanced  
Materials, Inc.  
Wheelabrator Group  
Wisconsin Oven Corp.

**Y**

YXLON

**Z**

ZEISS Industrial Metrology

## **CAST IN NORTH AMERICA EXHIBITORS** (as of February 15)

Cast in North America at Metalcasting Congress showcases the capabilities of North American metalcasters for buyers and designers. It is the premier marketplace for casting end-users.

ATEK Metal Technologies  
Atlas Foundry Company  
Badger Alloys  
Bremen Castings Inc.  
Charlotte Pipe & Foundry  
Craft Pattern & Mold Inc.  
Dakota Foundry  
Decatur Foundry Inc.  
Denison Industries  
Dotson Iron Castings  
Eagle Alloy Inc.  
Eck Industries Inc.

Falcon de Juarez  
Harmony Castings  
Leclair Manufacturing Co.  
Lethbridge Iron Works  
Lou-Rich Inc.  
Monarch Industries Ltd.  
Northern Iron & Machine  
Osco Industries Inc.  
Pier Foundry & Pattern Shop  
Product Development &  
Analysis (PDA) LLC  
Rochester Metal Products Corp

Specialty Steel Group, Hitachi  
Metals  
St. Croix Castings Inc.  
Stahl Specialty Co.  
TB Wood's Inc.  
Tooling & Equipment  
International  
TPI Arcade Inc.  
Watry Industries LLC  
Waupaca Foundry

121<sup>st</sup>  
**METALCASTING**  
 APRIL 25-27, 2017  
 MILWAUKEE, WISCONSIN | **CONGRESS**

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Metalcasting Congress  
 c/o CompuSystems  
 2651 Warrenville Rd., Suite 400  
 Downers Grove, IL 60515 or email to  
 metalcasting@compusystems.com  
 Ph: 224-563-3770

No one under 16 allowed on show floor.  
 No cameras permitted.

Name	Title	Member ID#	
Company		Address	
City	State/Province	Zip/Postal Code	Country
Telephone	Fax	E-mail address	

Spouse's Name (if attending)

Fees	Advance Registration	On-Site Registration
	Received March 1 - April 24	April 25-27
<b>Members</b>		
Exhibits	\$75	\$100
Education & Exhibits	\$625	\$650
<b>Non-member</b>		
Exhibits	\$150	\$175
Education & Exhibits	\$775	\$800
<b>Exhibitors</b>		
Exhibits	\$50	\$50
Education & Exhibits	\$425	\$425
<b>Spouse</b>	\$35	\$35

Yes, I will be attending the Exhibit Floor Reception on Wednesday, April 26.

Your email address will be used to communicate all registration information and will 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 given to exhibiting companies.

**Attention Students and Honorary Members:**

**Students**—Registration for full time North American college students 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.

Special Event Tickets	Qty	Fees
<b>Copper Luncheon—\$55</b> (Tuesday, April 25 • 11:30 a.m.)		
<b>Annual Banquet—\$110</b> (Tuesday, April 25 • 7:00 p.m. Cash Bar Reception • 6:00 p.m.)		
<b>Division Recognition Luncheon—\$55</b> (Wednesday, April 26 • 11:30 a.m.)		
<b>Alumni Dinner—\$100</b> (Wednesday, April 26 • 6:30 p.m.) Must be AFS Alumni to Attend		
<b>President's Luncheon—\$55</b> (Thursday, April 27 • 11:30 a.m.)		

**Register Me For:**

Exhibits Only

Education & Exhibits

**Registration** \$ \_\_\_\_\_

**Special Events** \$ \_\_\_\_\_

**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)



**American Foundry Society**

**Cancellation/Substitution Policy**—Cancellations must be received in writing by March 31, 2017. Refunds on registration fees will be less a \$25 administration fee. Refunds on Special Event tickets will not be subject to the administration fee but must also be in writing by March 31, 2017. There will be NO REFUNDS after March 31, 2017. Substitutions will be accepted at any time. Send cancellation requests to [reginfo@metalcastingcongress.org](mailto:reginfo@metalcastingcongress.org) or via fax to 847-824-7848.