

About the Program

Secondary steelmaking refractory maintenance is vital to both productivity and safety in a meltshop and caster. It is important for those involved to have a thorough understanding of the basic concepts of refractory system design. Consultants, suppliers and recognized industry experts have developed a curriculum to educate attendees on the following topics: refractory raw material selection; properties of refractories, application and limitations of stir plugs, lances and slidegates; free opens, refractory handling, installation and pre-heating; ladle secondary steelmaking – LMF; and casting requirements and wear mechanisms.

Presentations will provide data from steelmaking operations, and attendees will benefit from the practical experience of the presenters, including the application of the latest tools and techniques being used. Open discussions will allow participants to gather additional information and network with attendees and instructors.

Who Should Attend

This conference is intended for steelmaking operations personnel, maintenance and supervisory employees. Refractory suppliers and service suppliers should also attend. The AIST Ladle & Secondary Refining and Refractory Systems Technology Committees strongly believe that this course provides the basic knowledge for a better understanding of secondary steelmaking, refractory and insulating systems.

Registration Fees

Advance registration by 22 August 2023: Member US\$945, Non-member US\$1,195. Registration fee after 22 August 2023: Member US\$1,045, Non-member US\$1,295. Registration fees include Tuesday and Wednesday breakfast and lunch, reception, Thursday breakfast, plant tour with bus transportation, and a course workbook or flash drive including presentations.

Hotel Accommodations

A block of rooms has been reserved at the Marriott Phoenix Resort Tempe at The Buttes. Please call the hotel at +1.800.228.9290 by 12 September 2023 to secure the AIST discount rate of US\$199 per night for single/double occupancy.

Professional Development Hours

This course may qualify for up to 14 Professional Development Hour (PDH) credits. Each attendee will receive a certificate listing the quantity of PDH credits earned for the course. This course is not approved for PDH credits in New York, Florida, North Carolina and Oklahoma.

Attention Non-Members

Non-member registration fees include membership in AIST through 31 December 2024. Membership is not automatic. A completed membership application must be returned to AIST.

Organized By

AIST's Ladle & Secondary Refining and Refractory Systems Technology Committees.

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US\$945 Before 22 August
US\$1,045 After 22 August

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INFORMATION



Secondary Steelmaking Refractories

A Practical Training Seminar

3–5 October 2023

Marriott Phoenix Resort Tempe at The Buttes
Tempe, Ariz., USA

Plant Tour: CMC Steel Arizona

[AIST.org](https://www.aist.org)

Tuesday, 3 October 2023

- 7 a.m. **Registration and Breakfast**
- 8 a.m. **Keynote Presentation**
Gilbert Hutton, CMC Steel Arizona
- 8:30 a.m. **Introductions**
Jimmy Barrett, Allied Mineral Products Inc.
- 8:45 a.m. **Raw Materials, Bricks and Shapes, Monolithics**
Ruth Engel, Refractory Consulting Services
The seminar will start by discussing the raw materials used in the manufacture of refractories, why they are used, their availability and expected characteristics. These raw materials will be combined to make bricks/shapes, and their effect on physical properties will be discussed. This discussion will be extended to castables, where additional parameters such as installation and dry-out will be presented.
- 9:45 a.m. **Break**
- 10 a.m. **Brick Manufacturing**
Korey Skala, HarbisonWalker International
- 10:45 a.m. **Break**
- 11 a.m. **Ladle Construction Design and Insulation**
Rob Doty, IMACRO Inc.
This presentation features a wide-ranging discussion about the many options in ladle refractory design. The basics of heat transfer will then be covered, from molten steel through layers of refractories to the steel ladle shell, followed by insulation choices, how they affect ladle shell temperatures, and refractory expansion dynamics.
- Noon **Lunch**
- 1 p.m. **Ladle Pre-Heat and Handling**
Rafael Bruch, Gerdau Long Steel North America Midlothian Mill
Steel ladles will be covered in detail, including pre-heating, refractory wear mechanisms and measuring options.
- 1:45 p.m. **Break**
- 2 p.m. **Ladle Free Opening — Practice and Performance**
Xin Zhang, Cleveland-Cliffs Indiana Harbor
Ladle free open at the caster is critical not only for the safety of operators, but also for steel quality. Reducing the unplanned turnaround due to non-free open makes a significant difference in continuous production. This presentation covers the fundamentals of steel ladle non-free open and countermeasures for improvement.

- 2:45 p.m. **Break**
- 3 p.m. **Ladle Stirring Application and Procedures**
John Springer and Jeremiah Brandon, Vesuvius
This presentation will discuss ladle stirring applications based on customer procedures. It will review the different types of plugs and mechanical support systems used throughout the USMCA region, and will troubleshoot common issues when it comes to the installation, run processing and removal of ladle stirring refractory.
- 4–5:30 p.m. **Panel Discussion and Reception**
Moderator: Jimmy Barrett, Allied Mineral Products Inc.
Panelists: Rafael Bruch, Gerdau Long Steel North America Midlothian Mill, and Abhishek Bhansali, Nucor Steel–Berkeley

Wednesday, 4 October 2023

- 7 a.m. **Breakfast**
- 8 a.m. **Secondary Steelmaking Process — LMF**
Abhishek Bhansali, Nucor Steel–Berkeley
This presentation provides an overview of the fundamental metallurgical processes and operational aspects involved in secondary steelmaking, with a specific emphasis on the ladle metallurgy furnace. Additionally, it addresses the practical challenges that arise during these processes. The presentation then delves into the impact of slags on refractory wear. Finally, the presentation concludes by discussing the significance of steel cleanliness and calcium treatment.
- 9 a.m. **Ladle Breakout Failure Investigation**
Dave Ehrhart, RHI Magnesita
This presentation will discuss investigation strategies for ladle and slidegate failure and offer insight on potential root causes.
- 9:30 a.m. **Break**
- 9:45 a.m. **Refractory Materials Testing**
Rakesh Dhaka, U. S. Steel Research and Technology Center
This presentation will provide information on how to select refractory materials, their testing methods and the impact of properties on performance.
- 10:45 a.m. **Break**
- 11 a.m. **Ladle Thermal Imaging**
John Lewis, Connors Industrials Inc.
Systems measuring slag from tap, ladle refractory at tap, ladle metallurgy furnace argon surface plum and rate of meniscus rise in vacuum tank degasser-supporting ladles.

- Noon **Lunch**
- 1 p.m. **Laser Technology to Measure Refractory Wear**
Sean Guy, Process Metrix LLC
The presentation will center around laser technology to measure refractory wear in steelmaking vessels. This technology can help steelmakers utilize their vessels more efficiently, safely push them longer and help guide their refractory practices.
- 1:45 p.m. **Break**
- 2 p.m. **Tundish Refractory**
Fred Adkins, HarbisonWalker International
This presentation will cover the refractory design and components of the different layers within tundish refractory systems. The design and functionality of tundish flow modifiers will also be discussed.
- 3:15 p.m. **Break**
- 3:30 p.m. **Flow Control Products**
Josh Kaser, RHI Magnesita
This presentation will explain the uses and applications of isostatic refractories as they are used at the caster.
- 4:15 p.m. **EAF Refractories Panel Discussion**
- 5 p.m. **Adjourn**

Thursday, 5 October 2023

- 7 a.m. **Breakfast**
- 8 a.m. **Plant Tour of CMC Steel Arizona** 🧢
- Noon **Return From Plant Tour and Conference Adjourn**



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