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# CONTINUOUS CASTING

A PRACTICAL TRAINING SEMINAR  
**20-23 OCTOBER 2014**  
SHERATON INDIANAPOLIS CITY CENTRE  
**INDIANAPOLIS, IND., USA**

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## ABOUT THE COURSE

Developed and presented with the talented resources of the Continuous Casting Technology Committee, this informative program targets the heart of steel-making: the frontline operator. The key focus of the program is to discuss the practical aspects of casting slabs, billets and blooms, while introducing the theoretical concepts. By achieving the proper teaching balance, attendee understanding of the process is ensured, without the need for technical backgrounds. This course is a must for the progressive, informed and educated steelmaker of the future!

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## WHO SHOULD ATTEND

This training seminar has been designed for the frontline casting employee. It would also be beneficial to individuals newly assigned to work in the casting area, suppliers of casting consumables and services, as well as others wishing to review major variables that impact the quality of as-cast products. The presentations will be geared toward general casting principles, with all machine types represented.

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## SCHEDULE OF EVENTS

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### MONDAY, 20 OCTOBER 2014

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4:00 p.m.  
Registration

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### TUESDAY, 21 OCTOBER 2014

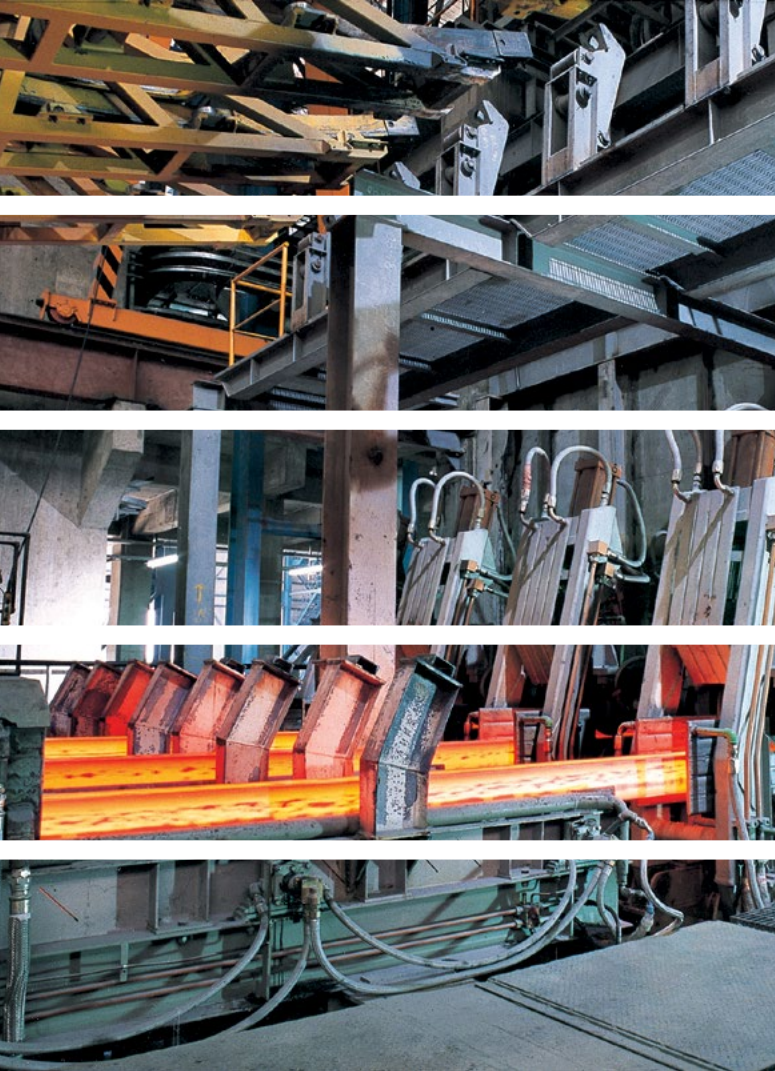
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7:00 a.m.  
Registration and Continental Breakfast

8:00 a.m.  
**Historical Perspective of Continuous Casting**

Jack Young, Hatch

A historical perspective of continuous casting will be given, illustrating the development and evolution of the process. The presentation will introduce the key elements of casting which will be addressed in subsequent lectures during the course.



9:00 a.m.

### **Continuous Caster Design and Technology (Slab and Long Products)**

Dewey Humes, SMS Siemag LLC, and Walt Antos, Siemens Industry Inc.

General technology and design considerations for long and flat product casting technology.

9:45 a.m.

Break

10:00 a.m.

### **An Operator's Guide to Continuous Casting Flux, What It Is, What It Does and How It Is Used**

Darrell Sturgill, Stollberg Inc.

Mold flux design, along with its reaction with steel inclusions, will be discussed. Operator's involvement related to start casts, consistent mold flux application and end-of-casting practices will be discussed.

11:00 a.m.

### **Initial Solidification and Oscillation Mark Formation**

Brian Thomas, University of Illinois at Urbana-Champaign

Initial solidification at the meniscus is critical to the surface of continuously cast steel. The phenomena that govern initial solidification are explained, with emphasis on how surface quality problems arise. Each mold oscillation cycle generates a periodic transverse depression called an "oscillation mark," and sometimes also a subsurface microstructural feature called a "hook." These features usually form due to meniscus overflow and depend on the alloy composition, superheat, fluid flow and level fluctuations, heat transfer to the mold walls, slag properties, and oscillation practice.

Noon

Lunch

1:00 p.m.

### **Impact of Secondary Cooling Water Quality**

Eric Rosenow, Nalco, and Steve Swoope, Delavan Spray Technologies

This presentation will review the water treatment-related challenges and needs in continuous caster secondary cooling systems and the potential impacts that secondary water quality can have on the maintenance and operations of a caster.

1:45 p.m.

### **Sources of Reoxidation and Why to Avoid**

Ron O'Malley, Missouri University of Science & Technology

To produce high-quality cast products, steel must be protected from reoxidation. Reoxidation can occur in the ladle, at secondary ladle metallurgy operation, and also in the transfer operations from ladle to tundish and tundish to the mold. Various techniques are described that can be used to minimize reoxidation.

2:45 p.m.

Break

3:00 p.m.

### **Caster Breakouts**

William Emling, SMS Siemag LLC

A review of the causes and prevention of breakouts, citing information contained in *The Making Shaping and Treating of Steel*<sup>®</sup>, 11th edition, Casting Volume.

3:45 p.m.

## **Caster Quality Defects and Their Potential Causes**

Ron O'Malley, Missouri University of Science & Technology

The surface and internal quality of continuously cast slabs and billets are intimately linked to the caster design and to the operating and maintenance practices employed in the continuous casting process. Common causes for five classes of continuous casting defects (longitudinal cracking, transverse cracking, slivers and lamination defects, internal cracking, and segregation defects) will be reviewed and linked to these design and practice influences.

## **WEDNESDAY, 22 OCTOBER 2014**

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7:00 a.m.

Continental Breakfast

8:00 a.m.

## **Mold Design, Copper Base Alloys and Mold Failure Mechanisms (Slab and Long Products)**

Ian Bakshi, KME America Inc.

Discussion will include requirements of copper molds, mold types, mold materials, operating factors affecting mold life and typical mold problems.

9:00 a.m.

## **Mold and Copper Maintenance and Coating Technologies**

Chad Donovan, SMS Millcraft

Discuss continuous casting mold types and general preventive maintenance practices. Specific information will be given on the importance of mold coatings and the various options available.

10:00 a.m.

Break

10:15 a.m.

## **Caster Roll Maintenance and Overlay Technologies**

Jeff Brower, Siemens Industry Inc.

This session will outline the effect of operations on caster rolls while focusing on available technologies to improve overall roll performance, extended roll lifetime and reducing maintenance cost.

11:15 a.m.

## **Bearings in Continuous Casting**

Warren Doerner, SKF USA Inc.

Bearings are a critical component of a caster segment, often the determining factor for segment life. This session will review the different types of bearings encountered, both common and upgrade alternatives. Failure modes and important considerations in achieving long service life will be presented. Along with containment roll bearings, other critical bearings, including ladle turret and mold oscillator bearings, will be discussed.

Noon

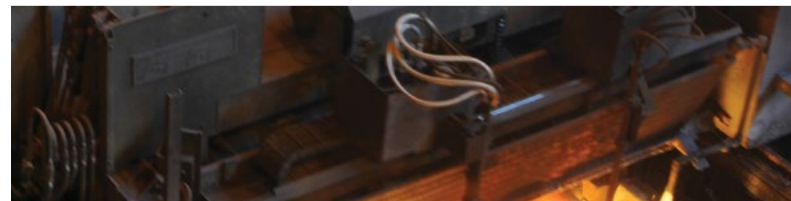
Lunch

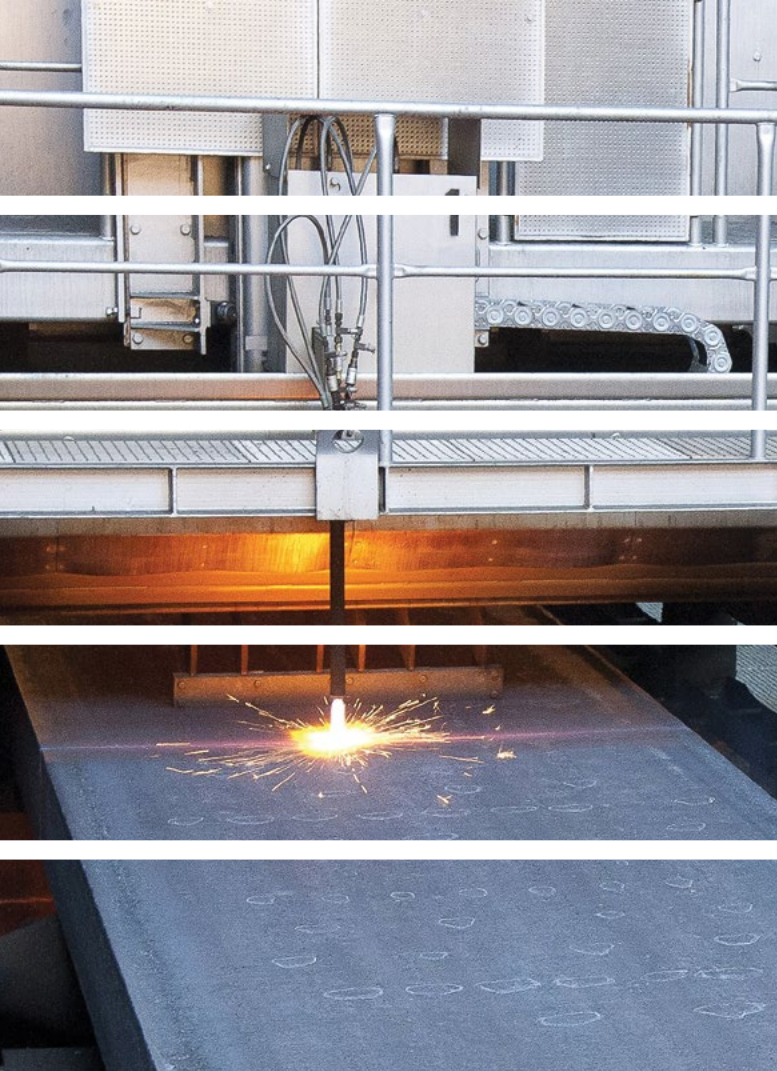
1:00 p.m.

## **Caster Hydraulics — Failure Modes and Preventive Maintenance**

Mark Cook, Yates Industrial Inc.

Cylinders used in casters, failure modes, preventive maintenance and effective cylinder reconditioning programs will be discussed.





**THURSDAY, 23 OCTOBER 2014**

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7:00 a.m.

Continental Breakfast

8:00 a.m.

**Plant Tour of Nucor Steel–Indiana or  
Steel Dynamics Inc. – Engineered Bar  
Products Div.**



Noon

Return From Plant Tour and Adjourn

1:45 p.m.

**Billet and Bloom Caster Maintenance**

Bill Schlichting, United States Steel Corporation

This presentation describes practical experience with casting of blooms and billets in regard to maintenance issues.

2:30 p.m.

Break

2:45 p.m.

**Roundtable Discussion**

Ron O'Malley, Missouri University of Science & Technology; Bill Schlichting, United States Steel Corporation; Richard Besich, ArcelorMittal; Ian Deeks, Nucor Steel–South Carolina

4:00 p.m.

Reception

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## REGISTRATION FEES

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Advance registration by 8 September 2014: Member US\$745; Non-member US\$960. Registration fee after 8 September 2014: Member US\$845; Non-member US\$1,060.

**>> REGISTER NOW**

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## COMPANY DISCOUNT

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Three or more individuals from the same facility attending any one seminar can receive a 10% discount per person. All registrations must be received together along with payment to qualify for the discount. Not applicable with any other discount.