

UPCOMING EVENTS

Long Products Rolling – A Practical Training Seminar

11–13 February 2020
Omni Jacksonville Hotel
Jacksonville, Fla., USA

The Making, Shaping and Treating of Steel: 101

10–11 March 2020
Hilton Richmond Downtown
Richmond, Va., USA

Digital Transformation Forum for the Steel Industry

16–18 March 2020
Omni William Penn Hotel
Pittsburgh, Pa., USA

COLD ROLLING FUNDAMENTALS

A PRACTICAL TRAINING SEMINAR

1–5 MARCH 2020

Francis Marion Hotel • Charleston, S.C., USA
Plant Tour: Nucor Steel–Berkeley

**AIST**
ASSOCIATION FOR IRON & STEEL TECHNOLOGY
Association for Iron & Steel Technology
186 Thorn Hill Road
Warrendale, PA 15086-7528 USA
+1.724.814.3000 • Fax +1.724.814.3005 • AIST.org

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ABOUT THE PROGRAM

This seminar provides a comprehensive overview of cold rolling. The course covers fundamentals, equipment, rolling theory, control, threading, rolls, lubrication, measurement, safety and new technology. Attendees will leave this course with a better understanding of the basic metallurgy involved, the different types of products and product attributes, the types of mills used and equipment involved with the mills, the theory of rolling, latest technologies involved in cold rolling, safety aspects, rolling solutions, production measures, and much more. Panel discussions will provide an opportunity to discuss issues and engage in problem solving.

WHO SHOULD ATTEND

This course may qualify for up to 23.50 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 credit in New York, Florida, North Carolina and Oklahoma.

ORGANIZED BY

AIST's Cold Sheet Rolling Technology Committee.

REGISTRATION INCLUDES

Breakfast and lunch Monday–Thursday, reception Sunday and Tuesday, 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 Francis Marion Hotel. Please call the hotel at +1.843.722.0600 or +1.877.756.2121 by 7 February 2020 to secure the AIST discount rate of US\$199 per night for single/double occupancy.

AIST MEMBERS
US\$1,195 US\$1,440
by 20 January 2020 after 20 January 2020

NON-MEMBERS
US\$1,295 US\$1,540
by 20 January 2020 after 20 January 2020



Visit AIST.org/byoyp for more information.



FEATURED PLANT TOUR:

Nucor Steel–Berkeley

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SCHEDULE OF EVENTS



Sunday, 1 March 2020

4–6 p.m.
Registration

6 p.m.
Welcome Reception

Monday, 2 March 2020

7 a.m.
Registration and Breakfast

8 a.m.
Introductions and Opening Remarks

8:10 a.m.
Overview
John Speer, Colorado School of Mines
General overview of products, metallurgy and processing from steelmaking to finishing, including product properties, end users and applications.

9 a.m.
Break

9:20 a.m.
Cold Rolling Fundamentals
John Speer, Colorado School of Mines
Deformation and metallurgical properties, iron-carbon phase diagram, grain size, stress-strain relationship, work hardening, effects of annealing, effect of percent reduction on R and N values, and effect of composition on properties.

10:10 a.m.
Break

10:30 a.m.
Rolling Mill Designs
Mark Zipf, SMS group Inc.
This presentation provides an introduction into contemporary rolling mill designs, with a special emphasis on how evolving material and process requirements directed their specific developments. Working outward from the roll bite, key parameters and “rules of thumb” are identified, in both the longitudinal and transverse directions, to illustrate how the force-loaded conditions/reactions dictate certain mill selection and sizing philosophies. This leads to a review of the various vertically oriented roll stack and structurally supported roll cluster arrangements, along with their associated roll gap and shape actuation strategies.

11:15 a.m.
Line Arrangements
Mark Zipf, SMS group Inc.

Noon
Lunch

1 p.m.
Entry Mill Equipment
Frank Beddings, Primetals Technologies USA LLC
Introduction to cold rolling entry end equipment and its function.

1:50 p.m.
Break

2:10 p.m.
Mill Exit Equipment
Brian Smith, ANDRITZ Herr-Voss Stamco Inc.
This presentation focuses on creating a finish coil in perfect quality for the subsequent processes. Included in the discussion are exit mill table design, measurement and control instruments, creating a proper tension, high-speed coiling under attention of strip quality, coil handling and strip quality devices, and economic fume exhaust system.

3 p.m.
Reversing Mill Modernization
Charles Belekis, Nucor Steel–Berkeley
This paper documents Nucor Steel–Berkeley’s reversing mill modernization project. It will highlight the electrical, mechanical and automation improvements of the mill.

3:30 p.m.
Break

3:50 p.m.
Hot Band Characteristics That Influence Cold Rolling
John Manko, Outokumpu Stainless USA LLC

4:40 p.m.
Roundtable Discussion

5 p.m.
Adjourn

Tuesday, 3 March 2020

7 a.m.
Breakfast

8 a.m.
Rolls Manufacturing and Materials Requirements
Konstantin Redkin, WHEMCO
This portion of the course will focus on understanding the rolls’ service life cycle from manufacturing steps to the final scrap diameter. Emphasis will be made on understanding the basics of the mill loading during cold rolling, using finite element analysis of the 4-high roll stack. The cold work roll’s material requirements will be discussed based on modern damage tolerance criteria. Microstructure evolution in the roll ingots and depth of hardening will be covered by explaining manufacturing thermomechanical routes.

8:50 a.m.
Break

9:10 a.m.
Roll Shop Practices: What Do Roll Shops Do for Your Mill?
Mike Jones, Nucor Steel–Berkeley

10 a.m.
Cold Mill Defects and Quality
Liz Hunter, Nucor Steel–Berkeley
Overview of incoming and outgoing defects for cold rolling. This will include descriptions of defects and root causes and suggest corrective actions for said defects.

10:50 a.m.
Break

11:10 a.m.
Safety 2020
Scott Hatchell, Nucor Steel–Berkeley
This presentation discusses teammate engagement, risk evaluation and taking care of the industrial athlete.

Noon
Lunch

1 p.m.
Plant Tour of Nucor Steel-Berkeley 🏠

5 p.m.
Return From Plant Tour

5:30 p.m.
Reception

Wednesday, 4 March 2020

7 a.m.
Breakfast

8 a.m.
Cold Rolling Lubrication Fundamentals
William Hartley and Brad Wellensiek, Quaker Houghton
This presentation will focus on cold rolling lubricant fundamentals. It will include information on key components of rolling oils and how lubrication is important in the cold rolling process.

9 a.m.
Break

9:20 a.m.
Cold Rolling Theory – Part 1
Mark Zipf, SMS group Inc.
This presentation is an examination of what’s going on in the roll bite and how the cold reduction/rolling process works. Analytic details of the force-loaded interaction and deformation behavior of the work rolls and material are discussed, along the longitudinal plane, including methods of modeling and characterizing the rolling process conditions and dynamics. The discussion provides insight into the practical use of and how to apply this theoretical understanding, including: process design and off-line simulation, what-if scenarios, performance and production prediction, multi-stage reduction/annealing planning, pass scheduling and setup modeling, mill/equipment sizing and selection, operational assistance, and guidance in problem resolution.

10:20 a.m.
Break

10:40 a.m.
Cold Rolling Theory – Part 2
Mark Zipf, SMS group Inc.

Noon
Lunch

1 p.m.
Automatic Gauge Control (AGC)
Mark Zipf, SMS group Inc.
This presentation is an investigation of the thickness control problem, including available sensors, actuators, control dynamics, perturbation sensitivities and algorithms. Details of the basic automatic gauge control (AGC) modes (in an ideal, fully instrumented, single-stand configuration) are discussed, as well as their performance characteristics and when/where to use them, including their adaptations for variations in the rolling conditions. A study of critical couplings/interactions between AGC activities, strip tensions, roll bite friction/rolling speed and shape control activities is followed by an expansion to tandem mill configurations and constrained

actuation/sensing arrangements. An examination of AGC performance characterization and specification will wrap up the session.

2 p.m.
Break

2:20 p.m.
Automatic Flatness Control (AFC) Shape/Flatness – Part 1
Mark Zipf, SMS group Inc.
This presentation gives an introduction into the overall shape/flatness control problem, including specific definitions of profile, shape and flatness. An overview of the distortion phenomena and its sources/formation is given, including an analysis of the force-loaded transverse roll stack deflection characteristics, thermal reactions and available corrective shape actuators. This is followed with a study of the shape actuator influence functions. Included is an examination of how to measure shape/flatness and the strategies used in contemporary systems. The discussion will also focus on the primary components, architecture, and theory of operation of automatic shape/flatness measurement and control systems. At the close will be an examination of shape/flatness control performance characterization and specification.

3:30 p.m.
Break

3:50 p.m.
AFC Shape/Flatness – Part 2
Mark Zipf, SMS group Inc.

5 p.m.
Adjourn

Thursday, 5 March 2020

7 a.m.
Breakfast

8 a.m.
Rolling Solution System and Maintenance
William Hartley and Brad Wellensiek, Quaker Houghton
An examination of the roll coolant system and its various components.

8:50 a.m.
Break

9:10 a.m.
Considerations for Cold Rolling of AHSS
Leland Robinson, Primetals Technologies USA LLC
Presentation on the requirements and considerations for cold rolling of advanced high-strength steels.

10 a.m.
Break

10:20 a.m.
The Importance of Mill Alignment

Noon
Lunch

1 p.m.
Rolling Mill Chatter Basics
Bob Miller, IVC Technologies
This presentation provides an overview of chatter that occurs in rolling mills in its various forms, including first octave, third octave, fifth octave, as well as grinder chatter. Areas covered will be how and where chatter can show up, some of the associated effects on equipment and product, as well as measures that can be taken to minimize or mitigate the issue.

2 p.m.
Work Roll Chroming and EDT, What is it and why does it work?
Craig Noble, Chrome Deposit Corp.
A brief introduction of chrome plating and electro discharge texturing of work rolls. How does it work and why is it needed?

2:30 p.m.
Break

2:45 p.m.
Motors and Drives Upgrades
Thomas Richards, TMEIC
Overview of motors and drives as applied to cold rolling.

3:30 p.m.
Efficient and Effective Strip Cleaning With Compressed Air
Kelly Sparks, SILVENT North America Inc.
Reduce noise levels, minimize energy consumption, and improve quality when using compressed air for cleaning, cooling and drying. Engineered compressed air blowoffs improve processes and allow mills to provide the high-quality steel demanded by its customers.

4 p.m.
Hydraulic Systems Troubleshooting
Mark White, Ascension Hydraulics LLC

4:30 p.m.
Roundtable Discussion

5 p.m.
Conference Adjourn