4 p.m.
Registration

5 p.m.
Reception

7 a.m.
Continental Breakfast

8 a.m.
**Introductions and Opening Remarks**
Mark Blankenau, Severstal Dearborn

8:15 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.
**Cold Rolling Fundamentals**
John Speer, Colorado School of Mines
Deformation and metallurgical properties, iron-carbide 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 a.m.
Break

10:15 a.m.
**Rolling Mill Designs and Line Arrangements to Meet Process Requirements**
Mike Peretic, SMS Siemag LLC
This presentation will begin with a brief history of the development of rolling technology, leading into a discussion of how material and process needs drove the development of various roll stack designs. Examples of 2-hi, 4-hi, 6-hi, MKW and cluster mill stack designs will be discussed with regard to their product applications. Various line configurations will also be presented to show relative production volumes for single-stand/single-pass mills, single- and 2-stand reversing mills, tandem mills, continuous tandem mills and coupled tandem mills.

Noon
Lunch

1 p.m.
**Entry Mill Equipment**
Frank Beddings, Danieli Corp.

2 p.m.
**Hot Band Requirements**
David Paton, ArcelorMittal Dofasco Inc.

2:45 p.m.
Break

3 p.m.
**Exit Mill Equipment**
Mark Landy, Siemens VAI

4 p.m.
**Practical Applications**
Mark Wellensiek, ArcelorMittal
**7 a.m.**
Continental Breakfast

**8 a.m.**
**Rolling Theory**
Tom Richards and Venugopal Reddy, TMEIC Corp.
This presentation will cover cold rolling theory that can be used for: preliminary analysis of mill configurations, evaluating control requirements, on-line control for mills with broad product ranges or operating conditions, evaluating potential process enhancements, predicting expected quality goals and understanding the rolling process — off-line tools, on-line maintenance, what-if analysis.

**10 a.m.**
Break

**10:15 a.m.**
**Rolling Theory (cont’d)**
Tom Richards and Venugopal Reddy, TMEIC Corp.

**11 a.m.**
Lunch

**1 p.m.**
**An Introduction to Automatic Gauge Control**
Chris Fryer, GE Energy Power Conversion
Automatic gauge control (AGC) is described for tandem cold mills of 4 and 5 stands, including feedforward and feedback controls. The control requirements for hydraulic and electric-screw stands are explained, as well as drive referencing for AC or older DC main drives. The established control methods for tension control (by speed or gap) are described in detail, along with the sequencing of control loops necessary for successful closed-gap threading and de-threading on batch rolling mills. Flying gauge change is described for continuously threaded mills with additional controls for reduction of tension, gauge and flatness variations on a product change.

**2 p.m.**
**Flatness Measurement and Control**
Paul Slater, GE Energy Power Conversion
Recap of shape theory, sensors, measurement principle, measurement rolls, measurement processing, decomposition into polynormal form, actuators and control loops, roll benching control, shifting, segmented sprays control and tilt control.

**2:45 p.m.**
Break

**3 p.m.**
**Inspection Practices**
Mark Blankenau, Severstal Dearborn
Inspection for cold rolled steel will be discussed. Sampling methods, frequencies, measurements, highlighting methods, lighting and response to observations will be presented.

**4 p.m.**
**Practical Applications**

**5 p.m.**
Reception
10:15 a.m.  
**Roll Cooling and Its Contribution to Cold Reduction Mill Productivity**  
Cliff Delmage, CLD Consulting  
This discussion will cover the methods for determining the required roll coolant for different cold reduction operations. The methods for measuring the effectiveness of existing roll coolant systems will be covered. Modern roll coolant systems and the recommended equipment for an effective roll coolant system for a modern cold mill will be covered in detail. The proper design of a system will be covered in detail, including a discussion of piping sizes and material, and the proper design of application headers. Indicators for roll coolant volumes and application deficiencies will be discussed.

Noon  
Lunch  

1 p.m.  
**Roll Specifications and the Influence on Roll Performance**  
George Ott, Union Electric Steel Corp.  
Roll performance is strongly influenced by the given roll specifications (hardness, depth of hardness, alloy selection). The manufacturing process also affects roll performance. Proper roll maintenance practices can further enhance roll performance.

2 p.m.  
**Roll Roughness, Hardness, Testing and Grinding Wheels**  
Jim Slawinski, Akers Roll  

2:45 p.m.  
Break  

3 p.m.  
**Roll Shop Best Practices**  
William Jennings, Rockport Roll Shop LLC  

4 p.m.  
**Practical Applications**  
Larry Flowers, Severstal Dearborn