



"Steel Days"

Educational Seminar Series

Sponsored by the Peoria Chapter of ASM

When:

August 12th 8:00 am to 4:30 pm (registration starts at 7:00 am)

August 13th 7:30 am to 12:00 pm

Caterpillar Inc. Technical Center – Bldg A Auditorium

Mossville, IL

What:

Learn about the steel making process for long and flat product and the physical metallurgy and heat treatment of steel from some of the best industry and academic experts! This seminar is being made available to all who are interested at the ASM subsidized price of **only \$15**. Topics will include:

“Modern Plate Production Technology” by Steven S. Hansen, Vice President and Chief Technical Officer, SSAB North America.

“Production of Special Quality Steels - Long Products” by Richard Nebiolo, General Manager Metallurgical Operations (Retired), Republic Engineered Products Inc.

“Heat Treatment, Microstructure, and Performance of Carbon and Alloy Steels” by George Krauss, University Emeritus Professor, Colorado School of Mines and Metallurgical Consultant.

Registration:

Please RSVP to Eric Morgan by July 31st, 2009

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Tel: 309-578-5363

Please direct all questions to Scott Magner

E-mail: Magner_Scott_H@cat.com

Tel: 309-675-7217

Who should attend:

Anyone interested in learning more about steel, steel making and processing, and applications of steel. Those who would benefit would include materials/metallurgical engineers, design engineers, supplier development engineers, and research engineers.

Seminar Agenda:

Time	Day 1 (August 12th, 2009)		Day 2 (August 13th, 2009)		Time
	Agenda Items		Agenda Items		
	Topic	Location	Topic	Location	
7:00 AM	Registration	TC-A			7:00 AM
7:30 AM					7:30 AM
8:00 AM	Speaker: Dick Nebiolo Topic: Production of Special Quality Steels - Long Products	TC-A Auditorium	Speaker: George Kruass Topic: Heat Treatment, Microstructure, and Performance of Carbon and Alloy Steels	TC-A Auditorium	8:00 AM
8:30 AM					8:30 AM
9:00 AM					9:00 AM
9:30 AM	Break		Break		9:30 AM
10:00 AM	Speaker: Dick Nebiolo Topic: Production of Special Quality Steels - Long Products	TC-A Auditorium	Speaker: George Kruass Topic: Heat Treatment, Microstructure, and Performance of Carbon and Alloy Steels	TC-A Auditorium	10:00 AM
10:30 AM					10:30 AM
11:00 AM					11:00 AM
11:30 AM					11:30 AM
12:00 PM	Lunch Break				12:00 PM
12:30 PM					12:30 PM
1:00 PM	Speaker: Steve Hansen Topic: Modern Plate Production Technology	TC-A Auditorium			1:00 PM
1:30 PM			1:30 PM		
2:00 PM					2:00 PM
2:30 PM	Break				2:30 PM
3:00 PM	Speaker: Steve Hansen Topic: Modern Plate Production Technology	TC-A Auditorium			3:00 PM
3:30 PM			3:30 PM		
4:00 PM			4:00 PM		
4:30 PM					4:30 PM
5:00 PM					5:00 PM

Seminar Details:

Seminar Title: "Heat Treatment, Microstructure, and Performance of Carbon and Alloy Steels" by George Krauss, University Emeritus Professor, Colorado School of Mines and Metallurgical Consultant.

Seminar Outline:

- Introduction to Steels: Definitions, History, Primary Processing of Bar Steels
- The Phases in Steels: Austenite, Ferrite, Cementite; Others depending on alloying
- Fe-C Phase Diagram and Its Modifications
- Ferritic, Pearlitic, Martensitic, Bainitic, and Austenitic Microstructures and Substructures
- Review of Hardenability, Alloying, and Transformation Diagrams
- Effect of Primary Processing on Microstructure: Inclusions and Banding
- Microalloyed Bar and Forging Steels
- Quenched and Tempered Martensitic Microstructures
- Hardness, Mechanical Properties, Deformation Behavior, and Fracture of Tempered Martensite

- Embrittlements: Quench, Tempered Martensite, Temper, Hydrogen

Seminar Title: “Modern Plate Production Technology” by Steven S. Hansen, Vice President and Chief Technical Officer, SSAB North America.

Seminar Overview:

The various steps involved in the plate production process from steelmaking to casting to plate rolling to off-line heat treatment will be reviewed. The fundamental metallurgical phenomena important in as-rolled plate production such as carbonitride solubility, grain size control, and austenite recrystallization and transformation behavior will be reviewed and related to the various processing approaches used in the production of modern high-strength steels. Production approaches including hot rolling, recrystallization controlled (or normalize) rolling, controlled rolling, accelerated cooling and direct quenching will be described and compared. The metallurgy behind normalized and quenched and tempered plate production will also be reviewed, and processing controls described. In addition, attention will be paid to some of the more practical characteristics of plates including the control of surface quality, the importance of reduction ratio, and those factors which influence workshop properties such as welding, bending and machining.

Seminar Title: “Production of Special Quality Steels - Long Products” by Richard Nebiolo, General Manager Metallurgical Operations (Retired), Republic Engineered Products Inc.

Seminar Outline:

- Objectives: Production of Special Bar Quality (SBQ) Steel Long Products With a High Degree of Internal Quality and Excellent Surface Quality.
- Process Flow for SBQ Long Products, Melting to Final Bar Inspection and Metallurgical Testing
- Liquid Steel Production
 - Objectives
 - Blast Furnace- Basic Oxygen Furnace Melting
 - Charge Iron Pellets and Coke to produce liquid Iron
 - Desulfurize
 - Convert to steel in BOF
 - Liquid steel characteristics
- Electric Furnace Melting
 - Charge Scrap
 - Charge slag ingredients
 - Melt using electrical and chemical energy
 - Liquid steel characteristics
- Refining
 - Chemical Analysis
 - Alloying
 - Heating

- Stirring
- Degassing
 - Chemical Analysis
 - Deep Degassing
 - Final additions
- Casting
 - Tundish design considerations
 - Shroud design considerations
 - Argon protection of liquid metal
- Reheating of Blooms
 - Modern furnace design and controls
- Rolling to Billets
 - Dimensional and weight controls
 - Surface quality
- Billet Inspection
 - Inspection methods
 - Surface inspection and remediation
 - Ultrasonic inspection
- Reheating and Rolling into Bar Products
 - Decarburization considerations
 - Grain size
 - Dimensions
 - Precision rolling
- Final Bar Inspection
 - Surface inspection
 - Ultrasonic inspection
 - MIL-STD-2154
 - Phased Array Ultrasonic Testing
 - Value-added Surface Enhancements
- Metallurgical Testing to Customer Specifications
 - Macroscopic Methods
 - Microscopic Methods
 - Physical Properties Measurements
 - Measurements of Steel Cleanliness
 - Macroscopic Methods:
 - Macro-etch -ASTM E381
 - Magnaflux- AMS 2300, 2301, 2304
 - Macro-Streak Flaw-JIS GO556
 - Blue Fracture
 - Microscopic Methods:
 - JK –ASTM E45-05 “Standard Test Methods for Determining the Inclusion Content of Steel” Methods A, C, D, E
 - JIS GO55
 - DIN 50602
 - ISO 4967
 - ASTM E45 Method A + Globular Sulfides

- Extreme Value Function
 - Ultrasonic Methods:
 - ASTM E588
 - Microsonic testing of Finished Bar Samples
- Applications of Bar Products
 - Off highway , Agriculture, Construction
 - Automotive
 - Energy
- Discussion, Questions, Answers