



The Making, Shaping and Treating of Steel: 101

11-13 October 2016 - Merrillville, Ind., USA - Radisson Hotel at Star Plaza

About the Course

The modern production of steel has evolved over many centuries, with many technological improvements during the last 25 years. The making, shaping, and treating of steel are critical to product design, application, cost and performance. It is essential that employees involved in producing iron and steel, operating rolling mills, supplying equipment and materials to the steel industry, designing products, engineering, sales and construction have an understanding of what steel is, how it is produced, and the effects of making, shaping and treatment on the final performance of steel products. This course provides essential knowledge to those who do not have a technical background in metallurgical engineering, rolling or quality-added downstream processing but have a need to understand more about the technical aspects of steel manufacturing, properties and applications.

Registration Fees

Advance registration by 29 August 2016: Member US\$795, Non-member US\$1,010. Registration after 29 August 2016: Member US\$895, Non-member US\$1,110. Registration includes Tuesday and Wednesday continental breakfast, lunch, and continuous breaks; Tuesday reception and joint dinner with the Midwest Member Chapter; Wednesday reception; Thursday continental breakfast; plant tour; choice of *The Making, Shaping, and Treating of Steel*® CD-ROMs, which include the 10th Edition or the following volumes from the 11th Edition: *Ironmaking, Steelmaking/Refining, Casting and Flat Products*; and a course workbook or flash drive including presentations.



Instructors

Dr. Ronald J. O'Malley

F. Kenneth Iverson Chair, professor and director, Kent D. Peaslee Steel Manufacturing Research Center, Missouri University of Science and Technology

In addition to more than 25 years of industry experience, O'Malley holds a Ph.D. in metallurgy from Massachusetts Institute of Technology and M.S. and B.S. degrees in materials engineering from Drexel University. He has also been recognized as an AIST Distinguished Member and Fellow and received the 2012 AIST Benjamin F. Fairless Award.

Dr. Steven G. Jansto

market and technical development manager, CBMM-North America
Jansto earned his Ph.D. in materials science and engineering and master's degree in metallurgical engineering from Illinois Institute of Technology, M.B.A. from Bowling Green State University, and B.S. degree in metallurgical engineering from Michigan Technological University. He has more than 30 years of operational, technical, quality control, process and physical metallurgy experience in steelmaking, clean steel technology, thick- and thin-slab casting, hot rolling and finishing of plate, and sheet and long products. He has published more than 125 papers internationally and received several AIST Jerry Silver Awards, one patent, and an ASTM recognition award, among others.

Tuesday, 11 October 2016

7 a.m.

Continental Breakfast and Registration

8 a.m.

Overview of the Making, Shaping and Treating of Steel and History of the Industry

The first session provides an overview of the technologies used to produce steel today and the evolution of world steel production. The general chemistry of steel is introduced to help illuminate the principles of iron- and steelmaking. This session ends with a brief history of metals production and an introduction to early iron- and steelmaking processes.

10 a.m.

Break

10:15 a.m.

Ironmaking and Steelmaking

This session explains the techniques used to produce iron and steel from raw materials, including ores and recycled materials. Processes reviewed include the blast furnace, direct reduction, ferrous scrap production, basic oxygen steelmaking and electric furnace steelmaking. The important gas, slag and metal reactions will be explained, as well as the important impacts of the processes on energy and the environment. The effects of the different processing techniques will be explained, and future iron- and steelmaking developments will be explored.

Noon

Lunch

For more information, visit

AIST.org/technologytraining

1 p.m.

Ladle Metallurgy, Slags and Refractories

Basic, acid, and neutral slags and refractories will be introduced, along with reasons for using each. The interaction of refractories and slags with metal will be explored, including methods of reducing refractory wear and quality improvements. The use of ladle metallurgy treatment and furnaces will be explained. The principles behind other secondary steelmaking techniques will be explained, including degassers and AOD steelmaking for the production of high-quality steels such as ultralow-carbon and stainless steels. Inclusion formation, modification and removal will be discussed.

3 p.m.

Break

3:15 p.m.

Solidification of Steel, Casting Defects and Prevention and Continuous Casting of Steel

The importance of solidification on final product quality will be discussed. The history and evolution of continuous casting processes from billets, blooms, and slabs to near-net-shape processes for thin slabs, strip, beam blanks and wire will be reviewed. The effects of tundish and mold metallurgy on product quality will be explained, along with casting defect causes and methods of prevention.

5:30-8:30 p.m.

Reception and Dinner With the Midwest Chapter at Avalon Manor

Wednesday, 12 October 2016

7 a.m.

Continental Breakfast

8 a.m.

Introduction – Hot Rolled As-Rolled End Products and Product Applications

The various end products of steel manufacturing will be introduced. The requirements and methods to produce these products will be reviewed.

9 a.m.

Break

9:15 a.m.

Rolling – Steel Incoming Material Defects and the Reheat Process and Steel Deformation

This section will provide an introduction to the theory of rolling and the effects of deformation processing on product quality and properties. The importance of the reheating process and how it affects subsequent rolling and quality will be discussed. Billets and blooms will also be reviewed.

Noon

Lunch

1 p.m.

Steel – Types and Properties

Characteristics, applications, and mechanical properties of steel alloys and grades will be explored. The effects of different alloying elements on steel manufacturing and final properties will be explained. An introduction of the methods of testing the properties of steel – including tensile, toughness and fatigue testing – will lead into discussions of the importance of melting, casting, rolling and forming on the final mechanical properties. The importance of selecting alloys and processing routes for specific engineering applications to achieve desired properties will be explained.

3 p.m.

Break

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4 p.m.

Downstream Processing

Steel finishing techniques, including heat treating and coating, will be reviewed. Basic steel heat treatment concepts of quenching, tempering, case hardening and in-process annealing will be introduced, along with the effects they have on steel microstructure and properties. Surface coating techniques, including galvanizing and other coatings, will be discussed.

5-6 p.m.

Reception

Thursday, 13 October 2016

7 a.m.

Continental Breakfast

8 a.m.

 **Plant Tour of ArcelorMittal Burns Harbor**

Noon

Return From Plant Tour and Adjourn

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