

# Winter 2016-2017 Education Calendar

## December

### Gating & Riser Design 201

Dec 6-7/Schaumburg, IL

### Casting Design

Dec 13-14/Schaumburg, IL

### Marketing & Selling of Castings Conference

Dec 13-14/Rosemont, IL

## January

### Aluminum 101

Jan 17/Columbus, OH

### Aluminum Crucible Furnace Practices

Jan 18/Columbus, OH

### Casting Defect Analysis

Jan 25-26/Schaumburg, IL

## February

### Introduction to Metalcasting

Feb 1-2/Schaumburg, IL

### Metalcasting Industry

### Human Resources Conference

Feb 1-3/Clearwater, FL

### AFS Institute Courses

Feb 8/Wisconsin Regional/Milwaukee, WI

### Iron Melting 201

Feb 21-22/Schaumburg, IL

### Environmental 101

Feb 21-22/Atlanta, GA

## March

### Green Sand Molding 101

Mar 2/Schaumburg, IL

### Nobake Molding & Coremaking 201

Mar 8-9/San Marcos, TX

### Copper 101

Mar 14/Platteville, WI

### Copper Melting 201

Mar 15-16/Platteville, WI

### Casting Cost Estimating

Mar 22-23/Schaumburg, IL

### Permanent Mold Thermal Management

Mar 28/Schaumburg, IL

## Courses Coming in the Spring

### Casting Defect Analysis

### Steel 101

### Green Sand Molding 201

### Hands-On Intro to Metalcasting

### Copper Metallurgy 201

### Aluminum Melting 201

### Aluminum Metallurgy 201

Follow up on dates and detailed course syllabi for these tentative courses at [www.afsinc.org/institute](http://www.afsinc.org/institute).

## Just in Time Education/ E-Learning

The AFS Institute developed 20 e-learning modules ranging from 15 minutes to 1 hour+ in length. These modules are viewable on any device or browser in our new Learning Management System (LMS).

Our e-learning modules focus on practical application you can use in your job immediately. Each module strives to engage you throughout the learning test while you learn new skills.

The e-learning modules consist of the following topics:

- 6 green sand molding modules
- 7 cast iron modules
- 6 casting defect analysis modules
- 1 copper module
- 1 Introduction to Metalcasting e-course

**Stay tuned for more e-learning modules coming in 2016-2017! Detailed module descriptions can be found at [www.afsinc.org/elearning](http://www.afsinc.org/elearning)**

See Courses  
Currently  
Available  
at the Back  
of this Catalog!



Register at [www.afsinc.org/institute](http://www.afsinc.org/institute)

Mid-Level



### Recommended Follow Up Courses

"Alloy" Metallurgy 201  
Casting Design

### Recommended Publications

*Basic Principles of Gating & Riser Design, 2<sup>nd</sup> Edition*

*Microstructure Development During Metalcasting*

## Gating & Riser Design 201 #17-17

December 6-7 / Schaumburg, IL / Member \$925 / Non-member \$1125

### Skills You Will Learn

This course is a continuation of Gating & Riser Design 101 with an emphasis on application of sands, chill, sleeves, and other thermal control properties, fluid flow principles and filtration, and your facilities process parameter ranges to positively change casting quality. Additionally, the course will discuss methods to translate quality requirements to cost implications for castings—primarily through scrap reduction and yield improvement to establish cost and quality objectives in the tooling design phase and track the actual information from this through the life of the tools; this includes tracking process parameter ranges and any additional on-the-fly modifications to the system.

### Who Should Attend

Individuals involved with developing tooling for castings produced with gravity pouring processes, improving casting quality issues related to the tooling, improving yield and production costs related to tooling design.

### Instructor(s)

Dr. Sudesh Kannan, *Consultant*  
Shelly Dutler, *AFS Institute*

## Casting Design #18-17

December 13-14 / Schaumburg, IL / Member \$925 / Non-Member \$1125

### Skills You Will Learn

This course addresses principles of effective metalcasting design by delving into the major factors that affect final part design. Participants will explore alloy selection, metalcasting process capabilities and limitations and their effects on casting design, and the impact of secondary operations. Other major topics will include design for manufacturability, fab to casting design conversions, dimensional control, and the importance of casting simulation. Discussion and case studies will be used throughout this 2 day course to illustrate effective and practical casting design principles. Participants should have knowledge and experience in designing engineered components prior to attending this course.

### Who Should Attend

Buying from casting suppliers; designing/engineering cast components; quality assurance

### Instructors

Vadim Pikhovich, *Magma Foundry Technologies*  
Jack Travis, *JET Technologies*



Mid-Level



### Recommended Follow Up Courses

Casting Defect Analysis  
Casting Supplier Auditing

### Recommended Publications:

*Designing & Purchasing Metalcastings*  
*Complete Casting Handbook, 2<sup>nd</sup> Edition*

## Aluminum 101 #19-17

January 17 / Columbus, OH / Member \$925 / Non-member \$1125

### Skills You Will Learn

This course covers the characteristics and properties of aluminum, alloying elements, and their general applications and considerations for working with aluminum cast parts. Participants will learn about melting and casting technology and the decision-making process behind specific technologies.

### Who Should Attend

Management, production engineers, production personnel new to working with aluminum, technical sales staff, purchasing staff, design engineers.

### Instructor(s)

Dave Neff, *Consultant*

Beginner-Level



### Recommended Follow Up Courses

Aluminum Melting 201  
Aluminum Crucible  
Furnace Practices

### Recommended Publications

*Aluminum Alloy Castings:  
Properties, Processes &  
Applications*

Beginner-Level



### Recommended Follow Up Courses

Aluminum Melting 201  
Aluminum Metallurgy 201

### Recommended Publications

*Best Practices in  
Aluminum Metalcasting*

## Aluminum Crucible Furnace Practices #20-17

January 18 / Columbus, OH / Member: \$925 / Non-member: \$1125

### Skills You Will Learn

This course covers basic furnace and crucible operations, including optimization, operations and maintenance practices for both electric and fuel-fired aluminum crucible furnaces. Participants of this course will leave with the knowledge or skills needed to select an appropriate aluminum crucible for their needs, operate and maintain aluminum crucible furnaces, store and handle crucibles to maintain the life of the crucible, avoid premature deterioration of the refractory, monitor and manage heating systems and burners, and optimize crucible furnace operations so that usage at any stage is efficient.

### Who Should Attend

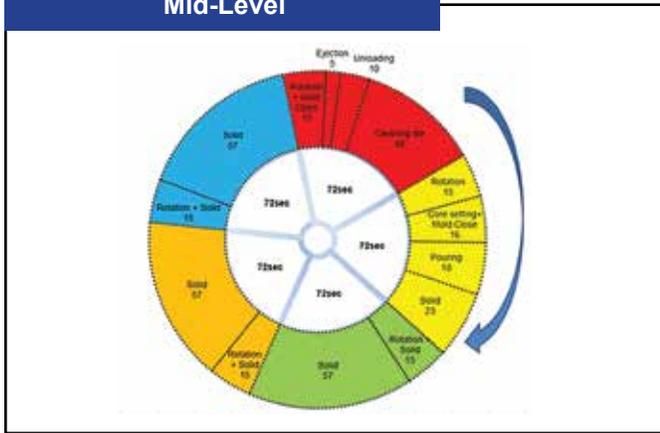
Individuals involved with aluminum crucible melting operations and/or aluminum crucible maintenance and handling in the foundry.

### Instructor:

David Neff, *Consultant*

# Classroom Courses

Mid-Level



## Permanent Mold Thermal Management #21-17

**NEW DATE** March 28 / Schaumburg, IL  
Member \$725 / Nonmember \$925

### Skills You Will Learn

Permanent mold casting is a significant and major process used in the metalcasting industry today. It can produce high quality and consistent products when a variety of control parameters are used to manage the overall process. This course provides essential information on key factors that affect the thermal profile in a permanent mold casting process cycle. The course will look at the most common permanent mold manufacturing practices for mold thermal management that focus on ensuring product quality.

### Who Should Attend

Individuals responsible for activities related to permanent mold making and operation: foundry engineer, foreman, quality and inspection personnel, tool engineer/mold designer, personnel involved in mold set up and mold holding fixture.

### Instructor:

Ted Schorn, *Enkei America Inc*  
Randy Oehrlein, *Carley Foundry*

### Recommended Follow Up Courses

Aluminum Crucible Furnace Practices  
Aluminum Melting 201

### Recommended Publications

*Aluminum Permanent Mold Handbook*  
*Best Practices in Aluminum Metalcasting*

Mid-Level

## Casting Defect Analysis #22-17

January 25-26 / Schaumburg, IL  
Member: \$925 / Non-member: \$1125

### Skills You Will Learn

In order to determine the true root cause of a casting defect and select the proper corrective action, a systematic evaluation method must be applied. Implementing the wrong solution can cost the foundry in terms of runtime, cost, waste, safety, reduced return on investment or profit, sales and expertise. The intention of this course is for participants to become proficient in applying a ten step procedure that will enable them to analyze and reduce metalcasting defects by correctly identifying defects and their root causes, and determining appropriate corrective actions. This course is applicable to sand molding processes (green, nobake, coldbox, shell).

### Who Should Attend

Those managing and overseeing the production management staff, managing and supervising production staff, purchasing, sales, marketing or office operations; auditing/inspecting/quality control; production or engineering or design.

### Instructors:

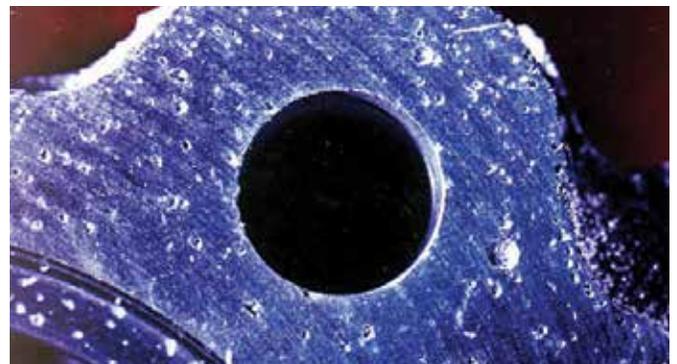
Dr. Sudesh Kannan, *Consultant*

### Two complimentary books with course registration

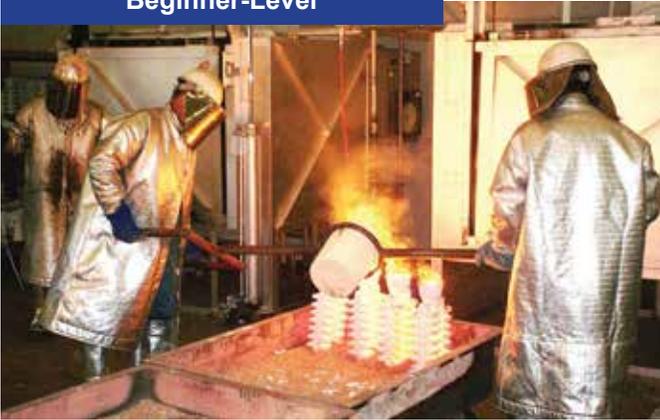
**\$135 Value**  +  **Casting defects handbook Choose From Iron & Steel, Copper-Base or Aluminum Alloys**

### Recommended Follow Up Courses

Foundry Process Improvement  
"Molding & Melting" 201 level courses



### Beginner-Level



## Introduction to Metalcasting #23-17

February 1-2 / Schaumburg, IL  
Member: \$925 / Non-member: \$1125

### Skills You Will Learn

This course introduces the process of metalcasting. It provides a broad picture of what happens in a casting production facility, while illustrating the technology, variables and complexity involved in producing a casting. It covers casting design, alloy selection, process selection, design of the gating system, pouring and shakeout methods, cleaning and finishing methods, quality assurance, and key safety and environmental regulations.

### Who Should Attend

Foundry production, management, office and administration, casting buyers and designers, production and/or sales staff of supplies and services to the industry.

### Instructors:

AFS and the Institute

### Recommended Follow Up Courses

Casting Defect Analysis  
"Alloy" 101 Courses

### Recommended Publications

*Metalcasting Dictionary*  
*Metalcasting Principles & Techniques*

### Mid-Level

## Iron Melting 201 #25-17

February 21-22 / Schaumburg, IL  
Member \$925 / Non-member \$1125

### Skills You Will Learn

This course provides detailed coverage of iron melting and related processes. Topics include charge materials selection; the understanding of cost, value, and risk; electric and cupola melting procedures; the relationship between molten metal and refractory lining; sampling and checks to determine iron quality; common effects of key major element adjustments; iron refining technology/treatment practices; and safety procedures.

### Who Should Attend

Process control, product quality, melting; shop floor operations, casting sales, foundry suppliers.

### Instructors:

Luke Dix, *Miller and Co.*  
Ken Way, *Miller and Co.*



### Recommended Follow Up Courses

Iron Metallurgy 201

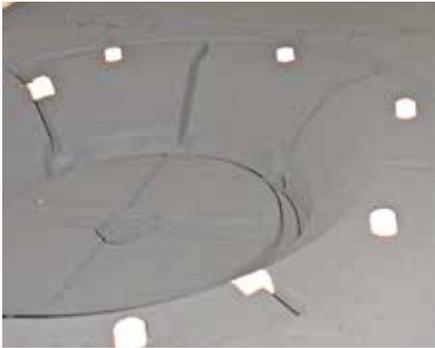
### Recommended Publications

*Cupola Handbook*



# Classroom Courses

## Beginner-Level



### Recommended Follow Up Courses

Green Sand Molding 201

### Recommended Publications

*Principles of Sand Control*

## Green Sand Molding 101 #26-17

March 2 / Schaumburg, IL / Member \$725 / Non-member \$925

### Skills You Will Learn

This course is an introduction to the green sand molding process used within a metalcasting facility. Discussion will include terminology, types of sands used, the mold making process, using and maintaining equipment, and considerations for preventing casting defects. Participants will leave the course with a basic foundation of the green sand molding process and techniques used in established facilities.

### Who Should Attend

Green sand molders, metalcasting supervisors or lead persons, sand lab technicians, maintenance personnel, new employees or anyone new to the green sand molding process

### Instructor(s):

Sairam Ravi , *University of Northern Iowa*



## Nobake Molding & Coremaking 201 #27-17

March 8-9 / San Marcos, TX / Member \$1075 / Non-member \$1275

### Skills You Will Learn

This two-day laboratory course held at the Texas State University is the second in the nobake series, providing participants with the next level of knowledge on the topic through discussion and hands-on laboratory activities. The course will cover specialty sands; sand variables and sand additives; types of chemical binders; how to determine the correct sand and binder for the application; the use of refractory coatings, adhesives, and release agents; how to evaluate problem areas with raw materials, binders and equipment; and how to make adjustments to ensure a quality mold.

### Who Should Attend

Those making molds and cores using the nobake/air set molding process, recognizing complex sand casting defects, monitoring/supervising employees responsible for making nobake molds and cores, modifying molding and coremaking processes to correct casting deficiencies, quality assurance.

### Instructor(s)

Tom Cobett, *T. Cobett & Associates*

John Roth, *Prairie Industrial Products, LLC*

## Mid-Level



### Recommended Follow Up Courses

Chemically Bonded Sand Testing  
Casting Defect Analysis

### Recommended Publications

*Mold & Core Test Handbook, 4<sup>th</sup> Edition*

*Coatings-Related Casting Defects Wall Chart*

## Copper 101 #28-17

March 14 / Platteville, WI / Member: \$800 / Non-member: \$1000

### Skills You Will Learn

This course held at the University of Wisconsin—Platteville provides participants an introduction covering the characteristics and properties of copper, alloying elements and their general applications, and considerations for working with copper cast parts. This course also covers melting and casting technology, and looks at the decision making process behind specific technologies used.

Benefits to taking this course include practical and theoretical knowledge for those entering into or establishing relationships with others in the copper casting business. It provides a comprehensive foundation of the processes, treatments and practical applications of cast copper and walks the participant through decisions that affect final product cost.

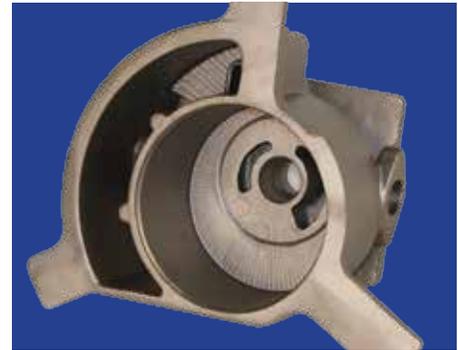
### Who Should Attend:

Management, production engineers, production personnel new to working with copper, technical sales staff, purchasing staff, design engineers.

### Instructor:

Mahi Sahoo, *Suraja Consulting*

### Beginner-Level



### Recommended Follow Up Courses

Copper Melting 201  
Copper Metallurgy 201

### Recommended Publications

*Casting Defects Handbook: Copper & Copper Based Alloys*  
*Metalcasting Principles & Techniques*

### Mid-Level



### Recommended Follow Up Courses

Copper Metallurgy 201

### Recommended Publications

*Casting Defects Handbook: Copper & Copper Based Alloys*  
*Casting Copper Based Alloys, 3<sup>rd</sup> Edition*

## Copper Melting 201 #29-17

March 15-16 / Platteville, WI / Member \$1075 / Non-member \$1275

### Skills You Will Learn

This laboratory course held at the University of Wisconsin—Platteville introduces the principles and best practices for copper melting and pouring to produce premium quality castings. This course will examine the various processes involved in melt protection, oxidation and de-oxidation, and degassing. Topics include furnace types and uses, charge materials, melting practices and tests for melt quality.

### Who Should Attend

Melting, metallurgy, quality and/or process control, management/supervision.

### Instructor(s)

Leigh Omer, *H Kramer & Co*  
Mahi Sahoo, *Suraja Consulting*

H. KRAMER & CO.



# Classroom Courses/Tentative Schedule

Mid-Level



## Recommended Follow Up Courses

Foundry Process Improvement  
Casting Design

## Casting Cost Estimating #30-17

March 22-23 / Schaumburg, IL / Member \$925 / Non-member \$1125

### Skills You Will Learn

Cost estimating is a critical factor in ensuring a manufacturing company continues to acquire customers and to be profitable. This course examines the various cost components and methods used to accurately estimate the casting production costs. It also provides information on common traps in casting estimates and measures that can be used to avoid them.

### Who Should Attend

Administration/Management, Casting Buyer/Designer, Cost Estimating, Finance/Accounting, Industrial Engineering, Procurement, Sales/Marketing

### Instructor(s)

Dr. Sudesh Kannan, *Consultant*  
Doug Dallmer, *CMS Associates Inc.*

## SPRING 2017 TENTATIVE SCHEDULE

### Casting Defect Analysis

In order to determine the true root cause of a casting defect and select the proper corrective action, a systematic evaluation method must be applied. Implementing the wrong solution can cost the foundry in terms of runtime, cost, waste, safety, reduced return on investment or profit, sales and expertise. The intention of this course is for participants to become proficient in applying a ten-step procedure that will enable them to analyze and reduce metalcasting defects by correctly identifying defects and their root causes, and determining appropriate corrective actions. This course is applicable to sand molding processes (green, nobake, coldbox, shell).

### Steel 101

This course provides participants an introduction covering the characteristics and properties of steel, alloying elements and grades of steel, heat treatment, quality control, as well as considerations for working with steel cast parts. This course also covers melting technology and casting technology.

### Green Sand Molding 201

This course provides participants with the next level of knowledge related

to the sand molding processes used within green sand foundries. The first day will focus on an introduction to applications requiring specialty sands; types of sand additives and their effects on green sand, equipment, sand handling and storage, sand reclamation and reuse, and green sand process variables and methods to make adjustments to ensure a quality mold is made. The second day will address green sand quality control tests for ferrous and non-ferrous alloys, reviewing the types, purpose, frequency, and typical result ranges for each, and finish with an introduction to statistical process control for sand systems.

### Hands-On Intro to Metalcasting

This three-day laboratory course, held at Pittsburg State University, introduces the process of metalcasting. It provides a broad picture of what happens in a casting production facility, while illustrating the technology, variables and complexity involved in producing a casting. It covers casting design, alloy selection, process selection, design of the gating system, pouring and shakeout methods, cleaning and finishing

methods, quality assurance, and key safety and environmental regulations. Students will participate in the making of several castings and participate in laboratory demonstrations throughout the course.

### Copper Metallurgy 201

Knowledge of physical metallurgy of copper alloys is necessary for the foundry metallurgists to effectively operate. This knowledge includes melt treatment, effects of alloy additions on physical and mechanical properties, solidification, heat treatment and final properties. The correlations between the processing technology, the defects and properties are an important feature for metallurgical as well as environmental issues.

### Aluminum Melting 201

This two-day laboratory course, held at Western Michigan University, introduces the basic principles and practices of aluminum melting for use in castings. The course will examine furnace charging, furnace temperature and its effect on the melt, and in-furnace treatments to reduce impurities. Melt sampling, transfer and pouring methods and the corresponding equipment will be analyzed, with laboratory

# Tentative Schedule/E-Learning Education Modules

demonstration and practice of various techniques throughout the course.

## Aluminum Metallurgy 201

The purpose of this course is to provide target audience participants with knowledge and skills regarding the nomenclature, terminology, principles, and techniques for the metallurgy of aluminum base casting alloys. This course makes clear the reasons why foundry personnel 'do what they do' in relation to aluminum casting metallurgy. This course examines aluminum structure and properties, the effects of alloying elements and the influence of melting operations on impurities; how to interpret (read) phase diagrams and recognize characteristics from microstructures; how grain refinement and modification work in foundry operations, how they are measured and the benefits of both; inclusion formation and filtration techniques; and much more.

## AFS SCHEDULE 2016-2017

### Marketing & Selling of Castings Conference

**December 13-14, 2016 / The Westin O'Hare / Rosemont, IL**

Don't be left out in the cold. Attend the 2016 Marketing & Selling of Castings Conference and learn from several sessions covering ways to drive your marketing and sales. Other topics include 10 questions foundry sales people should be able to answer, bridging the gap between end-users and their casting suppliers, social media strategies, and trade show marketing. The two keynote speakers will be Edgar Papke, writer, business consultant, and leadership coach, who will talk about linking your company culture to your customer's needs, and Ryan Dohrn, founder of Brain Swell Media, who will share how to successfully redesign your website and drive your sales and marketing message.

### Metalcasting Industry Human Resources Conference

**February 1-3, 2017 / Hyatt Regency Clearwater Beach Resort & Spa Clearwater, FL**

Stay up to date with the latest in labor and human resources policies for your metalcasting facility with presentations from this conference. This year will again include union and non-union breakout sessions, plus cover employment and labor laws, employer rights and obligations, and news from Washington, D.C.

### Environmental 101

**February 21-22, 2017 / Crowne Plaza Atlanta Airport / Atlanta, GA**

This seminar will cover best practices in environmental management, including waste, air quality, water quality and stormwater management.

## E-LEARNING EDUCATION MODULES

### Introduction to Metalcasting

This e-course introduces the process of metalcasting. It consists of multiple modules covering a broad picture of what happens in a casting facility, while illustrating the technology, variables, and complexity involved in producing a casting. It covers casting design, alloy selection, process selection, design of the gating system, pouring and shakeout methods, cleaning and finishing methods, quality assurance, and safety and environmental regulations.

## Cast Iron Modules

### Introduction to Cast Iron

This module identifies the industries that use cast iron, identifies what elements are alloyed together to make cast iron; and defines several mechanical and physical properties that make cast iron the choice to use. By the end of the module, you will be able to describe the critical factors and features of cast iron.

### Introduction to Cast Iron Microstructure

This module, explains the differences between unary, binary, and ternary phase diagrams; identifies the microstructure components in the cast iron phase diagram and explains how and why microstructures form. By the end of this module, you will be able to identify unary, binary, and ternary phase diagrams.

### Six Families of Cast Iron

This module explores the designation systems and details of each of the six families of cast iron. The *Introduction to Cast Iron* module is a prerequisite for this module. By the end of the this module, you will be able to identify how elements in cast iron are adjusted to produce different grades, explain the classification systems for each of the six cast iron families, and discuss the mechanical and physical properties of each of the six families of cast iron.

### Elements in Cast Iron

This module, explores the roles of carbon, silicon, and alloying elements in cast iron. It concludes with two real world case studies that compare different cast iron grades. By the end of this module, you will be able to analyze how different elements affect the properties of cast iron.

### Introduction to Cast Iron Melting

This module provides a brief overview of the cast iron melting process. It defines general safety practices to perform while working on the shop floor and when visiting a metalcasting facility. It also identifies the multiple furnace types used in cast iron melting. By the end of this module, you will be able to briefly explain the metalcasting process and apply safety procedures to your daily work environment.

# E-Learning Education Modules

## Basic Melt Practices for Cast Iron

This module explores the different melting and pouring procedures, quality tests (pre- and post-casting), talk about cooling rates, and introduces the three types of melt treatments used in metalcasting facilities. By the end of this module, you will be able to state four important inspection/testing methods for determining cast iron quality and describe the basic melting practices and related technologies for cast iron.

## Introduction to Cast Iron Heat Treatments

This module examines the reasons why cast iron metalcasting facilities heat treat their castings. It also defines the various heating and cooling cycles available. By the end of this module, you will be able to explain the use of heat treatment in cast iron and how that affects mechanical properties and cost.

## Casting Defect Analysis Modules

### Introduction to Casting Defect Analysis

This module is divided into three parts:

- Part 1: Meet Metro Metalcasting, Inc.
- Part 2: Casting Defects Categories
- Part 3: Analyzing Casting Defects

In Part 1, you'll meet a fictional company that is suffering from a high percentage of defects. Through the solutions team, we'll be introduced to a systematic approach to analyzing and reducing casting defects, the 10-Step Procedure. In Part 2, you'll learn about the seven categories of casting defects and become familiar with the *International Atlas of Casting Defects*. In Part 3, you will walk through how to use the 10-Step Procedure to solve a casting defect. You will be introduced to the tools used in each of the 10 steps and how to use them. By the end

of this module, you will be able to identify the 10-Step Procedure and use these steps to analyze a casting defect.

### Gas Related Defects

This module identifies the many sources of gas related defects and identifies the three types of gas related defects. This module also identifies the causes of these three types of defects and control measures you can make at your workplace. By the end of this module, you will be able to list the three types of gas related defects and two control measures for each gas related defect.

### Oxide Related Defects

This module defines oxides and identifies the different types of oxide related defects. It also identifies the oxide related defect causes and control measures to combat the defects. It briefly examines some gating system topics and how oxides can be affected by the gating system. By the end of this module, you will be able to identify the types of oxide related defects and list two control measures to preventing oxides.

### Sand Related Defects

This module reviews the sand molding process and identifies the four types of sand casting methods. This module also explores the three different types of sand related defects. These defects are sand expansion, sand adhering, and sand strength. Along with the in depth explanations of these defects, this module addresses possible control measures you can make to your sand system to combat these defects. By the end of this module, you will be able to identify the three different sand related defects and one control measure to implement, per sand related defect.

### Shrink Related Defects

This module defines shrinkage and identifies the different types of shrink related defects. It also identifies the shrink related defect

causes. We will also distinguish shrink defects from gas defects. This module identifies shrink control measures and briefly examines some gating system topics to show how shrinkage can be affected by the gating system. By the end of this module, you will be able to identify the types of shrink related defects and list two control measures to preventing shrink defects.

## Casting Defect Analysis Practice and Conclusion

In this module, you'll practice using the 10-Step Procedure on a casting defect. This module is the culmination of the previous five modules. AFS recommends the following modules before taking this one:

- Introduction to Casting Defect Analysis
- Gas Related Defects
- Oxide Related Defects
- Sand Related Defects
- Shrink Related Defects

By the end you'll be able to identify the 10-Step Procedure and use these steps to analyze a casting defect.

## Copper Modules

### Copper Casting Alloys

In this module, we will explore the Unified Numbering System (UNS) of copper; identify the different types of copper alloys; and identify the different alloying elements in copper castings. By the end of this module, you will be able to explain the UNS for copper and discuss the role of alloying elements in copper castings.

## Green Sand Molding Modules

### Green Sand Raw Materials

This module identifies the different types of sand, clay, and additives that go into making a green sand mold. It discusses the features and properties that affect compactability and the role of water in a green sand mold. By the end of the module, you will be able to identify and assess raw materials used in creating high quality green sand molds.

## Green Sand Preparation and Quality Control

This module explores the mulling sequence of horizontal wheel mullers and identifies primary tests involved in basic process control. This module also explores green sand strengths and requirements for different alloys. By the end you will be able to analyze raw material issues that may affect the quality of green sand molding outcomes.

## Green Sand Molding Equipment

This module identifies the five key pieces of molding equipment needed to make a quality green sand mold. Proper maintenance of each piece of equipment is also

discussed. This module consists of an optional safety section concerning personal protective equipment (PPE) and molding equipment. By the end you will be able to describe the measures required to use and maintain equipment appropriately and safely.

## Green Sand Molding Process

This module explores how to make a quality green sand mold and identifies the parts needed to make a mold. It describes several molding processes used and addresses the topic of venting. By the end you will be able to list the steps needed for preparing high quality green sand molds.

## Green Sand Compaction

This module explores the different types of sand compaction and states ways to prevent and resolve sand compaction problems. By the end you will be able to list the four methods to compact sand to ensure optimum quality castings.

## Introduction to Green Sand Defects

This module identifies the visual inspection and physical properties needed to look at green sand defects. This module also identifies the causes of common green sand defects. By the end you will be able to identify one shrinkage defect, one gas porosity defect, one sand adherence defect, one sand strength defect, and one sand expansion defect.

## Institute Courses During Wisconsin Regional

Three courses will be available to the attendees of the Wisconsin Regional, February 8, 2017.

**\$350 for one session/\$650 for two sessions (\$50 discount)**

Morning session: 8:00-11:30 a.m./Afternoon session, 12:15-3:45 p.m.

AM: Virtual Casting Process or Identifying the Correct Casting Defect

PM: Casting Material Properties or Identifying the Correct Casting Defect

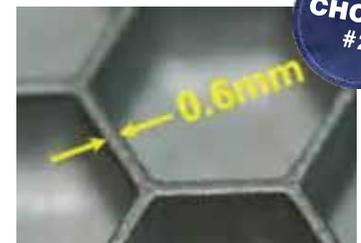
### Virtual Casting Process

This course provides participants with a basic overview of the metalcasting process. The course will trace the path of a casting from quoting through shipping. This course covers common metalcasting terms and highlights the activities inside the major departments of a metalcasting production facility.



### Casting Material Properties

This course provides an in depth discussion on expected performance of a casting. The production process influences the resulting mechanical properties and expected level of quality. The impacts of irregularities and post casting treatments is discussed along with testing methods for determining properties and existing sources of property information that can be used in the casting's design.



### Identifying the Correct Casting Defect

Provides participants with a basic overview of the casting defect analysis procedure. Topics include an introduction to the ten-step method for casting defect identification, writing a good problem statement, the importance of recording process parameters and an introduction to navigating the International Atlas of Casting Defects.





**AFS and the Institute**  
 1695 N. Penny Lane  
 Schaumburg, IL 60173-4555  
 www.afsinc.org



**Hands-On Interactive Metalcasting Courses For You!**

# AFS Institute

*Your Education Solution for Metalcasters, Suppliers & Casting Buyers*

## Highlights Include:

- Aluminum 101
- Aluminum Crucible Furnace Practices
- Casting Cost Estimating
- Casting Design
- Copper 101
- Copper Melting 201
- Gating & Riser Design 201
- Green Sand Molding 101
- Introduction to Metalcasting
- Iron Melting 201
- Nobake Molding & Coremaking 201

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