Course Syllabus
Iron 101: An Introduction to Iron & Iron Casting Processes

Course Code: 3-110
CEUs: 0.6 CEUs

Course Introduction
This is an introductory course covering the major cast iron families. Topics include characteristics and properties as well as general applications for each iron type, common alloying elements and their uses, iron melting technology and considerations, compatible casting processes, and heat treatment options and applications.

Learning Outcomes
At the end of this course, participants should be able to:
1. Describe the critical factors and features of cast iron that make it the casting alloy of choice.
2. How elements in cast iron are adjusted to produce different grades.
3. Explain the classification systems for each of the 5 cast iron families.
4. Discuss the mechanical and physical properties of each of the 5 families of cast irons.
5. State 4 important inspection/testing methods for determining cast iron quality.
6. Analyze how different elements affect the properties of cast iron.
7. Describe the basic melting practices and related technologies for cast iron.
8. Compare iron casting processes.
9. Explain the use of heat treatment of cast iron and how that affects mechanical properties and cost.
10. Apply safety procedures to the daily work environment in a metalcasting facility.

Lesson Outline
• Module 1: Introduction
• Module 2: Overview of cast iron
  o Lesson 1: Where are iron castings used?
  o Lesson 2: Why cast iron is commonly used?
  o Lesson 3: Cast iron key points
• Module 3: Cast iron classification systems and properties
  o Lesson 1: Cast iron families (gray iron, ductile iron, CG iron, white iron, malleable iron, high alloy irons)
  o Lesson 2: General cast iron properties overview (mechanical properties, physical properties)
  o Lesson 3: Designation systems
  o Lesson 4: Gray iron (properties, examples, uses)
  o Lesson 5: Ductile iron (properties, examples, uses)
  o Lesson 6: CG iron (properties, examples, uses)
  o Lesson 7: White iron (properties, examples, uses)
  o Lesson 8: Malleable iron (properties, examples, uses)
  o Lesson 9: High alloy iron (properties, examples, uses)
• Module 4: Elements in cast iron
  o Lesson 1: Main elements in cast iron
  o Lesson 2: Minor and trace elements in cast iron
• Module 5: Applications of cast iron alloys
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- Module 6: Cast iron melting technology
  - Lesson 1: Cast iron safety
  - Lesson 2: Furnace types
  - Lesson 3: Melting practice overview
- Module 7: Iron casting processes
  - Lesson 1: Sand casting
  - Lesson 2: Investment casting
  - Lesson 3: Lost foam casting
- Module 8: Heat treatment overview
  - Reasons for heat treatment, heat treatment options, and results of heat treatment
- Module 9: Conclusion

Instructional Methods:
- Facilitator led discussion
- Q & A sessions
- Group activities
- Case studies
- Videos
- Individual problem solving

Assessment Methods:
No formal assessment will take place in this course; however, attendees will participate in informal activities such as knowledge check and Q&A sessions with the facilitator to verify that learning outcomes are being met. Assessment of successful achievement of learning outcomes must be included throughout the course in order to meet the ANSI/IACET 1-2013 standard for continuing education programs and for CEUs to be awarded.

Attendee Requirements to Earn CEUs:
1. Present at least 6 hours of the total 6.5 hours of instructional time (90%), which does not include meals or breaks.
2. Active participation (can include asking questions, communicating with other attendees during and taking part in group activities, providing responses during whole class or group discussions).
3. Successful achievement of learning outcomes.

Who Should Attend?
The target audience for this course consists of individuals responsible for:
- Foundry production and management
- Process control
- Quality assurance
- Buying from casting suppliers
- Designing/engineering cast components
- Production and/or sales of supplies and services to the industry
- New employees or anyone new to iron casting