Course Syllabus
Gating & Riser Design 201

<table>
<thead>
<tr>
<th>Course Code</th>
<th>CEUs</th>
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<tbody>
<tr>
<td>6-210</td>
<td>1.2 CEUs</td>
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**Course Introduction**
Casting quality, yield, and cost are a function of the gating and riser design. This course is a continuation of the concepts introduced in Gating & Riser Design 101. Participants will work on case studies to develop gating and risers to provide clean, sound and functional castings. A continuation of the fluid flow and solidification principles will serve to guide participants to decision making regarding the quality of castings. Emphasis will be placed on hands-on activities, animations, and simulations to enhance understanding of the filling and solidification processes in a foundry. Focus will be on practical examples in iron, steel, aluminum, and copper castings. The goal will be to introduce the participants the basics of gating and riser design, common industry norms and troubleshooting.

**Learning Outcomes**
1. Describe the use of sleeves, hot topping, specialty sands and the cost vs. benefit of using each.
2. Describe sand and chill properties.
3. Measure the influence of sand and chill properties on the cooling condition to positively affect casting quality.
4. Describe fluid flow principles governing the flow of liquid metal.
5. Measure how fluid flow principles governing the flow of liquid metal positively affects casting quality.
6. Identify the use of filters and other hydraulic controls.
7. Describe the influence of process parameter ranges with a fixed tool design on the casting cost and quality.
8. Identify how to accommodate for variations in process parameters and still achieve the specified casting quality.
9. Translate quality requirements to cost implications for castings.
10. Develop a closed-loop tooling performance feedback system.

**Lesson Outline**
Module 1: Introduction
Module 2: The Gating and Riser System
   • System review
   • Calculating gating and riser case study
Module 3: Sand & Chill Properties
   • Physical properties of common sand and chill materials
   • Measuring the thermal influence
Module 4: Feeding Aids
   • Riser aids
   • Specialty sands
Module 5: Gating Design
   • Fluid flow principles measurement and quality control
   • Filtration
Module 6: Casting Quality Control
   • Critical process parameters and their ranges
   • Accommodating variations in the process
- Scrap reduction & yield improvement  

Module 7: Closed-loop Performance System  
  - Cost & quality objectives  
  - Capturing & delivering results  

Module 8: Conclusion  

**Instructional Methods:**  
- Class discussion  
- Equipment and procedure demonstrations  
- Group activities  
- Individual problem solving  
- Case studies  

**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.

**Recommended Course Prerequisites:**  
- Gating & Riser Design 101  
- Aluminum 101, Steel 101, Copper 101, or Iron 101

**Texts, Books or other Resources available for purchase:**  
  [http://www.afsinc.org/ProductDetail.cfm?ItemNumber=4165](http://www.afsinc.org/ProductDetail.cfm?ItemNumber=4165)

**Attendee Requirements to Earn CEUs:**  
1. Present at least 11 hours of the total 12 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:  
- 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