Copper Alloys Workshop 2025

Schaumburg, Illinois, USA
17 - 18 September 2025

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2025 Copper Alloy Workshop

September 17 – 18, 2025
AFS Headquarters

Wednesday, September 17th, 2025

Session 1: Basic Metallurgy

Session Chair: Ryan Showalter, *AFS' Copper Workshop Chair, Fresno Valves & Castings Inc., Selma, CA*

Learn how alloying elements influence performance, how to prepare and melt charge materials efficiently, and how to control oxidation, gas content and grain structure for optimal casting quality.

7:30 am **Registration**

8 am **Introduction/Welcome** N/A
Ryan Showalter, *AFS' Copper Workshop Chair, Fresno Valves & Castings Inc., Selma, CA*

8:15 am **Metallurgy of Cast Copper Alloys** 1
Mike Buyarski, *The Federal Metal Co., Bedford, OH*

The basic metallurgy of copper and its alloys is presented. Starting with an introduction to copper, possible alloying elements including major and minor, and their impact on properties are discussed. Copper alloy families are introduced with possible applications.

Principles and best practices of copper alloy melting will be discussed. Topics include Charge materials, Oxidation, gas content, melt protection and processing (deoxidation, degassing, grain refinement). The discussion also includes tests for melt and casting quality.

9:45 am **Copper Alloy Melting for Efficiency and Quality** 43
Leigh Omer, *H. Kramer & Co., Chicago, IL:* **Ryan Showalter**, *Fresno Valves & Castings Inc., Selma, CA*

In this presentation you will learn how to properly choose and prepare charge materials and how to evaluate the quality of those materials. You will also be given some ideas on the proper methods to melt those materials for efficiency in different types of furnaces.

10:30 am **BREAK**

Session 2: Melting

Session Chair: Eric Sivill, *Neptune Technology Group, Inc., Tallassee, AL*

Learn best practices for charge makeup, temperature control, and metal cleanliness when melting copper alloys. Gain tips for preventing defects, improving energy efficiency, and troubleshooting common melt-related issues.

10:45 am **Induction Furnace** N/A
Patrick O'Connor, *Inductotherm Corp., Rancocas, NJ*

This session will cover the fundamentals of coreless induction melting and the key preventive maintenance practices that keep systems running safely and reliably. Attendees will learn the most important daily and

monthly checks for furnaces, power supplies, water systems, and hydraulics, along with practical steps to extend equipment life and reduce downtime.

11:30 am **Crucibles & Refractory Linings for Induction Furnaces** 73
Jeremy Fischer, *Foseco, Pittsburgh, PA*

This presentation will introduce the basics of induction furnace linings for copper alloys. This includes how induction melting works, what types of linings are available, when each type of lining is used, how to properly install them, common mistakes made, and the cause of common lining failure modes. This will provide a basis of knowledge for attendees to better understand linings usage in their induction furnaces and help avoid common pitfalls that lead to decreased metal throughput.

12 pm *(noon)* **LUNCH**

Session 3: Molding/Sand

Session Chair: Jeff Sorenson*, Neptune Technologies Group, Lincoln, AL*

Discover how to improve casting quality by reducing variation in key green sand properties and applying proven control methods. Then, learn design best practices for 3D printed sand molds and cores through a bronze casting case study that showcases success from prototype to production.

1 pm **Tracking and Reducing Variation on Key Greensand Variables** 86
Al Jacobson*, American Colloid Co., Hoffman Estates, IL*

The presentation will discuss the benefits of tightly controlling the key independent variables of: Compactability, Active Clay and AFS Washed Aggregate Sizing. These three variables are independent of other greensand properties and are controlled primarily with a system's major inputs of: water, clay, and sand. Also presented will be ideas to define and track a system's current level of variation, so as changes are implemented their effect on variation can be statistically evaluated.

2 pm **BREAK**

2:15 pm **3D Printed Sand Design Considerations for Casting Production** 103
Dave Rittmeyer, *Matthews Additive Technologies, Pittsburgh, PA*

3D Printed Sand is one of many options foundries use to produce castings. 3DPS has multiple advantages however, it also has limitations. Being aware of these advantages and limitations will provide you with the necessary tools to make decisions for successful projects. We will review and discuss key design practices. Properly designing cores and molds is the key to successful castings no matter the binder system used. As we make our journey into discussing these practices, we will see how these considerations played into this bronze casting case study. By using 3DPS this bronze project was successful from prototype to production.

2:45 pm **Occupational Health and Safety Update for Nonferrous Foundries** 126
Kay Rowntree, *Industrial Hygiene Sciences LLC, Waterford, WI*

While the federal government may be shrinking in size, much is still going on in the occupational health and safety regulatory sphere that may impact your foundry. We will discuss recent state activities to regulate workplace exposure to lead, changes at OSHA and NIOSH, OSHA proposals to update existing rules, and recent enforcement activities in nonferrous foundries.

3:45 pm **PANEL: Casting Defects**
All Speakers/Group Discussion

Have you ever had a scrap problem that you just cannot find a solution for? If so, we have a panel session that can help with that problem. Come join Industry Experts in this panel session that will focus on scrap issues and how to fix that problem casting that always seems to show up. You can bring that casting with you to the Copper Workshop. If you are worried about getting on the plane with your casting, you can send it directly to AFS. Please include any specifics on molding process, alloy, sand properties, etc. - anything that can help the panel members and others in the session to help come up with a solution or solutions.

4:45 pm **Day 1 Concludes**

5:30 pm **Networking Reception** *(Drinks, appetizers & golf)*

- **Topgolf Schaumburg**
  2050 Progress Parkway
  Schaumburg, IL 60173

Thursday, September 18th, 2025

Session 2: Project Management

Session Chair: Gerald Richard, *MAGMA Foundry Technologies, Schaumburg, IL*

8 am **Project Management** 142

David Halm, *Project Success, Atlanta, Georgia*

We are all in the project business. Be it technology deployment, a merger or corporate initiative. Shifting the Worry Curve, introduced here, is a simple, practical and efficient process to improve your project cycle. Think better schedules, clear objectives, met expectations, higher accountability and maintained budgets.

9 am **Casting Cost Analysis** N/A

Gerald Richard, *MAGMA Foundry Technologies, Schaumburg, IL*

Cost is an important input into tooling design. Foundry engineers attempt to fit the maximum number of impressions on a plate and slim the gating system to produce economically viable castings that meet quality and production requirements. For challenging castings, however, it is hard to gauge the cost impact of each design trade-off. This presentation introduces a structured approach to embedding cost evaluation in the tooling workflow, shows scenario planning for alternative rigging choices, and closes with a case study that demonstrates how this method helps the engineer make better decisions.

9:30 am **BREAK**

9:45 am **Gating & Risering: A Case Study** 152

Ryan Showalter, *Fresno Valves & Castings, Inc., Selma, CA*

A case study is presented in which a part with over 30% scrap is simulated to understand shrinkage characteristics and gating strategies. After applying a novel gating strategy which was only made apparent through simulation, the scrap was successfully reduced to less than 1%.

10:15 am **Gating Breakoff Technology: A Case Study** 161

Paul Clements, *Sloan Valve Co., Augusta, AR*

This case study reviews Sloan's break-off process for semi-red copper castings designed to separate from their gating system during shakeout. The method relies on impacting the semi-solid sprue to create a clean fracture

at the gate. Best suited for low-ductility alloys, this approach eliminates the need for secondary cutoff operations. The presentation will cover process setup, material considerations, and lessons learned in applying break-off techniques to copper-based alloys.

11 am **Weld Repair** 167

Dr. Jerry Kovacich, *EWI, Columbus, OH*

The domestic copper alloy casting industry is experiencing supply shortages and long lead times, especially for large castings. One promising avenue for increasing productivity and alleviating shortages is by reducing reject rates through weld repair of casting defects. If undertaken with care, repair welding can fill casting voids or defects that would normally lead to part rejection. This talk will focus on the welding metallurgy of copper alloys, candidate processes for repair welding of copper alloys, and the current state of the art in welding automation and digital manufacturing for weld repair. Strategies for welding of common copper alloy families will be discussed, with an emphasis placed on historic best practices for cast alloys and methods to test feasibility of new weld repair applications. Common welding process attributes such as deposition rate, joint accessibility, and as-deposited properties will be discussed to guide process selection for a range of casting repair applications. EWI will also provide case studies for advanced digital manufacturing technology including robotic defect grinding and weld repair, scan-to-plan defect sizing and weld repair, reducing workforce requirements through cobotics and telemanufacturing, and how hybrid manufacturing and additive manufacturing can improve (but never replace) casting processes. EWI will wrap up the talk with a look ahead at promising casting repair technologies recently developed and how they may provide benefits for certain copper casting applications.

11: 45 am **LUNCH**

12:45 pm **Defect Analysis** 187

Paul Clements, *Sloan Valve Co., Augusta, AR*

This Casting Defect Analysis class will introduce a hybrid approach that combines key components of the DMAIC (Define, Measure, Analyze, Improve, Control) and Total Quality Management (TQM) methodologies to identify and address the root causes of scrap in copper casting operations. Attendees will explore how these complementary approaches can be integrated to systematically diagnose quality issues, implement effective countermeasures, and drive continuous improvement. Additionally, participants will learn how to apply TQM principles, such as customer focus, process optimization, and employee involvement, to create a culture of quality and achieve sustainable results. By the end of the session, attendees will be equipped with the tools and strategies needed to improve process efficiency, reduce scrap, and enhance product quality in their casting operations.

1:45 pm **Economic Update** 198

Ben Yates, *American Foundry Society, Inc., Schaumburg, IL*

Ben Yates will share a brief overview of data trends and economic indicators from the 2025 Mid-Year Forecast & Trends report published by AFS in July.

2:30/3 pm **Workshop Concludes**