



Foundry and Metal Casting Course: Sand, Investment and Die Casting, Melting and Defects



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Introduction:

Foundry and metal casting operations, covering sand, investment and die casting, melting and casting defects, is a 5-day course for foundry managers, casting process engineers and melt-shop, moulding and quality supervisors, ending with a Casting Quality and Scrap Reduction Plan for a case foundry. Foundries supplying pump bodies, valve housings and replacement parts lose margin and customer approvals when porosity, shrinkage, sand inclusions and misruns drive scrap and rework. Nominees run moulding lines, furnaces or casting inspection, and learn through inspection walkthroughs of moulds, melt records and defective castings. CoreConcept Training Center delivers this foundry and metal casting course.

Course Objectives:

- Assess a foundry's pattern, core, moulding, melting and finishing chain and locate where scrap and rework originate
- Control green sand and chemically bonded sand properties so moulds and cores resist erosion, penetration and gas defects
- Run melting, degassing, inoculation and pouring practice that delivers clean metal at the specified chemistry and temperature
- Design gating and risering systems that feed shrinkage-prone sections and keep metal flow free of turbulence
- Diagnose porosity, shrinkage, misrun, cold shut, hot tear and inclusion defects and set investment and die casting cell controls against them
- Build a Casting Quality and Scrap Reduction Plan with inspection acceptance criteria and foundry safety controls

Target Audience:

- Foundry management staff responsible for output, scrap rate and on-time delivery of cast components
 - Casting process engineering staff responsible for methoding, gating, risering and process sheets
 - Melt-shop supervision staff responsible for furnace charging, metal treatment and pouring
 - Moulding and coremaking supervision staff responsible for sand systems, patterns and mould quality
 - Casting quality engineering staff responsible for inspection, non-destructive testing and customer approvals
 - Industrial localisation and supplier development staff responsible for qualifying cast pump and valve parts
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Course Outline:

Day 1: Foundry Value Chain, Casting Routes and Scrap Baseline

- Foundry Process Map From Pattern to Fettled Casting
- Sand, Investment and Die Casting Route Comparison by Alloy
- Cast Pump and Valve Component Requirements From Drawings
- Yield Calculation for Runners, Gates, Risers and Returns
- Scrap and Rework Pareto Baseline for a Foundry

Day 2: Patterns, Cores and Sand Systems

- Split Pattern Design With Cope, Drag and Draft
- Core Box, Core Print and Core Venting Layout
- Green Sand Testing for Moisture, Compactability and Permeability
- Chemically Bonded No-Bake Sand Mixing and Strip Time
- Mould Coating, Ramming and Sand Reclamation Control

Day 3: Melting, Metal Treatment and Feeding Design

- Induction, Cupola and Crucible Furnace Charge Make-Up
- Rotary Degassing With Argon or Nitrogen for Aluminium
- Ductile Iron Spheroidising and Inoculation Treatment Practice
- Gating System Ratios, Choke Area and Filter Placement
- Riser Sizing by Modulus Method and Hot Spot Feeding

Day 4: Investment and Die Casting Cells and Defect Diagnosis

- Investment Casting Wax Tree, Shell Building and Dewax
- High-Pressure Die Casting Shot Profile and Die Temperature
- Gas Porosity Versus Shrinkage Cavity Identification on Sections
- Misrun, Cold Shut and Hot Tear Root Cause Analysis
- Sand Inclusion, Metal Penetration and Burn-On Countermeasures

Day 5: Inspection Walkthrough and Casting Quality Plan Build

- Radiographic and Dye Penetrant Acceptance Walkthrough of Castings
 - Foundry Safety Walkthrough for Molten Metal and Silica Dust
 - Case Foundry Defect Mapping Against Process Records
 - Corrective Action Matrix for Sand, Melt and Gating Faults
 - Casting Quality and Scrap Reduction Plan Completion and Review
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Skills You Will Gain:

- Foundry Process Mapping
- Sand System Control
- Melt Treatment Practice
- Gating and Riser Design
- Die and Investment Casting Control
- Casting Defect Diagnosis
- Casting Acceptance Inspection
- Foundry Hazard Control

Why Attend This Course:

- Deliver a Casting Quality and Scrap Reduction Plan for a case foundry to the foundry manager and the quality lead for approval
- Decide which casting route, sand system and feeding design suits a pump or valve component before tooling is ordered
- Avoid customer rejections, repeated weld repairs and lost melt capacity caused by porosity, shrinkage and sand defects
- Pass on the sand test log, gating calculation sheet, defect atlas and corrective action matrix to moulding and melt-shop teams

Conclusion:

Back at work, the participant presents the Casting Quality and Scrap Reduction Plan to the foundry manager, the melt-shop and moulding supervisors and the quality lead. The plan guides decisions on which defect families to attack first, which sand, melt and gating changes to trial, and which inspection acceptance levels to agree with customers buying pump, valve and replacement castings. After the first production month under the plan, the foundry should compare scrap rate, yield, rework hours and customer rejections against the baseline and update its corrective actions.

Frequently Asked Questions FAQ:

What should participants know before the foundry and metal casting course?

Participants should already work in moulding, melting, finishing, casting engineering or casting quality. Basic familiarity with ferrous or non-ferrous alloys helps. A calculator is used for yield, gating ratio and riser modulus exercises, and anonymised scrap records or defect photographs from the participant's foundry make the walkthroughs more useful.

How does the foundry and metal casting course differ from a general manufacturing processes or steelmaking course?

This course stays inside the foundry: patterns, sand, melt treatment, feeding design, investment and die casting cells and casting defects. General manufacturing process courses compare machining, forming and additive routes, while steelmaking courses cover primary melting and continuous casting of semi-finished products.

Why does foundry and metal casting practice separate gas porosity from shrinkage porosity?

The two look alike yet have different causes. Gas porosity comes from hydrogen, moisture or turbulence and appears as smooth round holes, while shrinkage comes from unfed hot spots and shows rough dendritic cavities. Treating the wrong one wastes degassing or riser changes.

What do participants take back from the foundry and metal casting course?

Participants take back a Casting Quality and Scrap Reduction Plan for a case foundry, with a scrap Pareto baseline, sand and melt control checks, a gating and riser calculation sheet, a defect diagnosis atlas and a corrective action matrix they can adapt to their own castings.
