

GRAY IRON FUNDAMENTALS

eLearning courses designed to increase productivity and profits



Learning made Simple, Visual, and Interactive

Gray Iron Fundamentals introduces the learner to the world of cast irons, including the properties, processes, and terminology associated with gray iron production. This course also includes defect analysis of the manufactured product. Presented in THORS' highly visual and interactive learning format, this course will help foundry employees become familiar with the important equipment processing steps associated with their profession.

Credit Hours **2.5**

Learning Objectives

- 💡 Understand the composition of cast irons.
- 💡 Understand the role of the various alloying elements in gray iron production.
- 💡 Examine the mechanical properties and thermophysical properties of gray iron.
- 💡 Differentiate between carbide dissolution and matrix adjustment.
- 💡 Identify common defects that occur during the production of gray iron castings.
- 💡 Recognize the grading systems used by ASTM and SAE.

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I. Gray Iron Properties

• Mechanical Properties

- o Ultimate Tensile Strength
- o Compression Strength
- o Hardness
- o Density
- o Damping Capacity

• Thermophysical Properties

- o Specific Heat
- o Thermal Conductivity
- o Coefficient of Thermal Expansion
- o Electrical Resistivity

• Gray Iron Chemistry

- o Microstructure of Iron
- Phases of Iron

- Phase Diagram
- Graphite Morphology
- o Cast Iron Composition
 - Iron
 - Carbon
 - 1. Carbon Equivalent
 - Silicon
 - Phosphorus
 - Sulfur
- o Recarburizers

• Grade Specifications

- o ASTM Grades
- o SAE Grades

II. Gray Iron Processing and Defects

• Gray Iron Processing

- o Inoculation
- o Alloying
 - Copper
 - Nickel
 - Tin
 - Molybdenum
 - Manganese

- o Undercooling
- o Carbide Dissolution
- o Matrix Adjustment

• Gray Iron Defects

- o Carbides
- o Pinholes
- o Shrinkage Porosity
- o Slag and Dross

