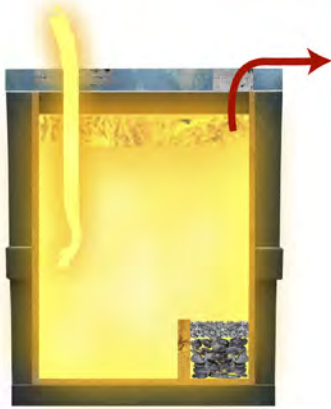


# DUCTILE IRON FUNDAMENTALS [2ND ED.]

*eLearning courses designed to increase productivity and profits*



## Learning made Simple, Visual, and Interactive

Ductile Iron Fundamentals introduces the learner to the properties, processes, and terminology associated with ductile 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 **3**

## Learning Objectives

- 💡 Differentiate between ductile iron and other forms of iron.
- 💡 Understand the relationship between the microstructure and properties of ductile iron.
- 💡 Recall the ductile iron grades that are used for application-specific purposes.
- 💡 Comprehend the treatment methods of ductile iron processing.
- 💡 Understand the concepts of nodularity, inoculation, fading, and tensile and hardness testing.
- 💡 Understand the various heat treatment processes that might be used for ductile iron.
- 💡 Identify common defects that occur during the production of ductile iron castings.

## Table of Contents

### I. Ductile Iron Properties

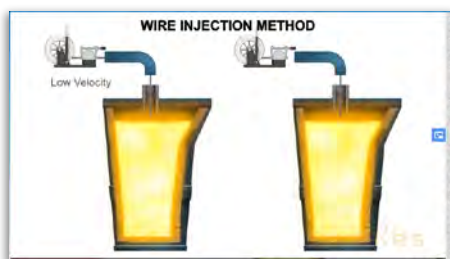
- Ductile Iron Mechanical Properties
- Microstructure of Iron
- Ductile Iron Chemistry
- Spheroidizing Elements
- Ductile Iron Grades

### II. Ductile Iron Processing

- Nodularity
- Treatment (Conversion)
- Inoculation (Post-Inoculation)
- Fading
- Undercooling
- Solidification

### III. Ductile Iron Defect Analysis

- Carbides
- Low Nodularity
- Abnormal Graphite Shapes
- Shrinkage Porosity
- Slag and Dross Inclusions



Ductile Iron Defect Analysis > Low Nodularity > Image Analysis			
Method	Sphericity	Compactness	Roundness
Example Image			
Calculation Factors	<ul style="list-style-type: none"> <li>• Sphericity = <math>(4 \times A) / \pi P^2</math></li> <li>• Where P is Perimeter</li> <li>• The entire perimeter is shown in red in the example</li> </ul>	<ul style="list-style-type: none"> <li>• Compactness = <math>(4 \times A) / \pi P^2</math></li> <li>• Where P is curved perimeter</li> <li>• P<sub>c</sub>, as shown by the red line, is shorter than the total perimeter of the particle</li> </ul>	<ul style="list-style-type: none"> <li>• Roundness = Area / <math>\pi \times (D/2)^2</math></li> <li>• D = Diameter of the smallest circle that could encompass the particle</li> <li>• Roundness = area of graphite per/area of smallest circle circumscribing the particle.</li> </ul>
Acceptance Ratio	> 0.55	> 0.77	> 0.5