



Course code    Course title  
METRO 005    Cast Iron

## Prerequisites

Basic physical metallurgy, basic thermodynamics including phase diagrams.

## Training Objectives

. **Learning Outcomes**, after the course you will possess knowledge about;

- Characteristics of different cast iron types
- Cast iron materials and properties with respect to processing conditions and alloy content
  - Grey irons
  - Compacted graphite cast irons
  - Ductile irons ( nodular cast iron)
  - Other cast iron types
- Inoculation of graphite in cast irons
- Solidification and solid state transformations in different cast iron types
- Defect formation in cast irons
  - Porosities
  - Metal penetration
  - Fin formation
- What can be predicted by means of computer simulation of cast irons?
- and much more.....

## Summary

The course gives a summary of where cast iron is used. The Fe-C-Si phase-diagram related to cast irons. Growth of different morphologies of graphite. Inoculation of graphite. Fading of inoculation. Thermal conductivity of cast irons. Agents to promote nucleation of graphite. Effect of inoculation on microstructure formation. Solid state (eutectoid) transformation to ferrite and pearlite. Effect of alloying elements on pearlite formation

Main factors influencing structure formation and mechanical properties

- Chemical composition
- Cooling rate
- Liquid treatment
- Heat treatment

#### Defects and defect formation

- Gas and slag reaction in cast iron melts
- Gas and shrinkage porosities
- Metal penetrations

What can be made to decrease fin formation when casting cast irons.

#### Use of simulation for predicting microstructure and properties in cast iron components

- Microstructure in a ductile iron bearing housing
- White chill wedge (grey iron)
- Simulating an experimental series of ductile iron plate castings
- Simulation of nodularity in CGI castings
- An example showing how a complex heat flow may affect structure formation in a ductile iron castings