Course code Course title

METRO 005 Cast Iron

Course summary

The goal of the course is to give a basic understanding about cast iron material and processing of cast irons.

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

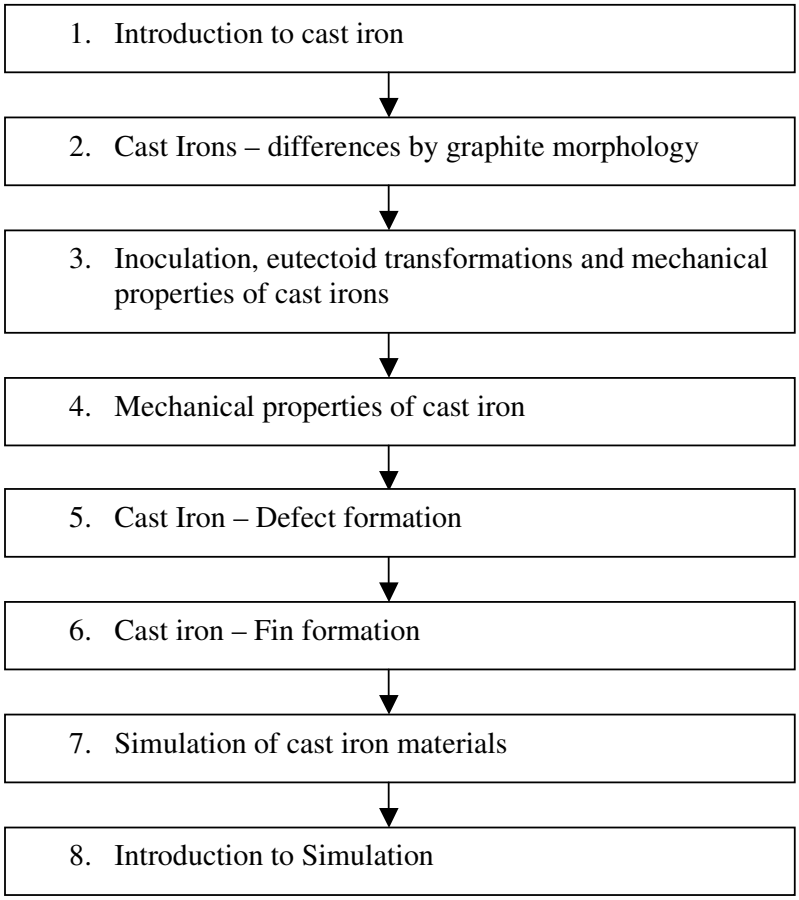
- Characteristics of different cast iron types
- Cast iron materials and properties with respect to processing conditions and alloy content
  - Grey irons
  - Compacted graphite cast irons
  - Ductile irons (nodular cast iron)
  - Other cast iron types
- Inoculation of graphite in cast irons
- Solidification 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…..

Lectures list

n.	Title	Summary	Lecturer	Duration
1	Introduction to cast iron	This is an introduction to the course and a short description on the casting research at Component Casting at Joenkoeping University, Sweden.	Ingvar L Svensson Magnus Wessén	16’
2.	Cast Irons – differences by graphite morphology	Introduction to where are cast iron are used. The Fe-C-Si phase-diagram. Growth of different morphologies of graphite. Inoculation of graphite. Fading of inoculation. Thermal conductivity of cast irons.	Ingvar L Svensson	48’

3	Inoculation, Eutectoid transformations and mechanical properties of cast irons	Purpose 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	Magnus Wessén	30’
4.	Mechanical properties of cast irons	Main factors influencing structure formation and mechanical properties • Chemical composition • Cooling rate • Liquid treatment • Heat treatment	Magnus Wessén	30’
5.	Cast Iron - Defect formation	Defects and defect formation • Gas and slag reaction in cast iron melts • Gas and shrinkage porosities • Metal penetrations	Ingvar L Svensson	53’
6.	Cast Iron - fin formation	What can be made to decrease fin formation when casting cast irons?	Ingvar L Svensson	26’
7.	Simulation of cast iron material	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	Magnus Wessén	33’
				3h 54’

Lectures prerequisites chart



Each arrow means a prerequisite.