FMH3113 Heat Treatment in Steel- It´s Physical Metallurgy 6.0 credits

Värmebehandling av stål- dess metallografi

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Official course syllabus of FMH3113 applies from VT19

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Admitted to third-cycle education and knowledge in micro- and nano-structures

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

Describe heat treatment processes for steel at a general level.

Describe basic micro-structures of steel and their thermodynamic and kinetic behaviour.

Predict the micro-structure of a low alloy steel based on knowledge of alloy content, heat treatment and cooling conditions and be able to relate to properties.

Explain and justify how alloying materials and heat treatment influence the micro-structure of a material and properties.

Solve certain heat flow and diffusion problems.

Account for the most common bulk and surface modifying methods that are used for steel.

Predict residual stress conditions and deformations of a part after heat treatment and cooling.

Give an account of properties of different heat treatment atmospheres

Describe the behaviour of different cooling media and its effect on the final micro-structure.

Course contents

The course is focusing on physical and chemical aspects of heat treatment of steel. The aim is to give a deeper understanding of changes in structure and properties during common industrial heat treatment processes. The contents include, e.g., overview of heat treatment processes, effect of alloy content, bulk and surface treatment and heat flow and diffusion, annealing, hardening, hardenability, martensite hardening and austempering, case hardening, acierage, nitriding, nitro-carburization and residual stresses

Examination

- INL1 - Assignment, 6.0 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

Compulsory attendance at 6 of 7 lectures

Write a review article with respect to a subject in the heat treatment field.

Participation and presentation of the subject chosen for the review article on a full-day seminar

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.