NOC:Heat Treatment and Surface Hardening - I - Video course

COURSE OUTLINE

Heat treatment is a fundamental principle required for processing of metals and alloys. By controlling time-temperature sequence with/without application of stress, it can modify the structure of the materials, which would influence the properties in a desired way. This principle lies strongly on the basics of thermodynamics and kinetics of phase transformations in metals and alloys, which is the guiding factor for deciding process schedule in Industry.

COURSE DETAIL

Week. No.	Lessons/Topics
1	Introduction - Definition (Materials tetrahedron perspective) - Aim Theory of Heat Treatment (Why, How, What) - Structure of Metals and Alloys and Materials - Phase diagram and phase transformation.
2	Phase diagram and phase transformation - Relation between thermodynamics and Kinetics for phase transformation.
3	Relation between thermodynamics and Kinetics for phase transformation - Phase transformation and heat treatment (Time and temperature influence).
4	Relation between thermodynamics and Kinetics for phase transformation - Phase transformation and heat treatment (Time and temperature influence) - Concept of JKMA equation and TTT diagram - Heat treatment time and temperature and microstructure/property developed .
5	Heat treatment time and temperature and microstructure (stereology) - CCT diagram from TTT diagram and experimental data and its implication to heat treatment.
6	Heat treatment time and temperature and microstructure (stereology) - CCT diagram from TTT diagram and experimental data and its implication to heat treatment.
7	Some heat treatments, like annealing, normalizing, hardening, tempering of steel on the basis of TTT and CCT diagram and properly-microstructure correlation.
8	Introduction to Precipitation hardening

References:

1.Principles of Heat Treatment of Steels by R.C. Sharma
2.Phase Transformations in Metals and Alloys by D.A. Porter and K.E. Easterling (Taylor and Francis)
3.Engineering Physical Metallurgy and Heat Treatment by Y. Lakhtein (Mir Publisher)

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Metallurgy and Material Science

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