TRAINING COURSE ON STEEL METALLURGY: PROPERTIES, PROCESS & HEAT TREATMENT

25 & 26 NOVEMBER 2025

Assoc. Prof. Dr. Nurulakmal Mohd Sharif &
Assoc. Prof. Ts. Ir. Dr. Anasyida Abu Seman
School Of Materials & Mineral Resources Engineering, Universiti Sains Malaysia (USM)

INTRODUCTION

At the end of this course, participants should be able to:

i) Explain the designation systems used for different steels

ii) Identify the alloying elements and carbon content in carbon and low-alloy steels based on their alloy designations

iii) Describe the common metallurgical phases and microstructure found in steels

iv) Explain the effects of the different microstructures that form in steel on steel strength and hardness

v) Explain how the iron-carbon phase diagram and time-temperature transformation diagrams are used to predict the phases present in a steel based on a heat treating thermal cycle

vi) Explain the effects of heat treatment temperature and time on steel microstructure

vii) Relate the effects of cooling rate to the microstructure formed in a steel

WHO SHOULD ATTEND

This course is designed for Design Engineers, Process Engineers, Manufacturing Engineers, Product Development Engineers, Managers, Mechanical Engineers with or without experience in metallurgy, Inspectors, Quality Control Engineers, Technicians, People involved in welding, fabrication and heat treatment.

Course Series No.: 10001616747

COURSE CONTENTS

***Steel Classification & Microstructure**
-classes of steel; carbon steel, tool steel, alloy steel
-typical alloying elements in steel and their function
-typical microstructure for steel: ferrite, pearlite, martensite, etc.

***Phase Diagram & Phase Transformation**
-iron carbide phase diagram: solubility limit of carbon, solid solution, useful information for heat treatment
-TTT diagram and how this is significant for heat treatment of steel

***Strengthening Mechanism in Metals**
-the 5 strategies to increase hardness and strength of metals

***Mechanical Behavior and Testing**
-review of mechanical properties: hardness, strength, shear strength, fatigue and creep
-mechanical testing: hardness measurement, tensite test, impact test, fatigue test and creep test

***Processing: Casting, Metal Deformation & Joining**
-principles of process (casting, metal deformation & joining)
-typical parameters that need to be controlled
-typical design do's and don'ts

***Heat Treatment of Steel, Annealing & Surface Treatments**
-annealing – full, rocess and sress-relief anneal
-quenching & tempering, martempering, austempering

*** Fracture & Typical Failures**
-types of failure: brittle, ductile, shear, bending
-fracture and failure analysis

REGISTRATION FEE AND ADMINISTRATIVE DETAILS

Members : RM1,500 per participant
Non-Members: RM1,700 per participant
Deadline For Registration: 20 November 2025 (Thursday)

No refund will be entertained although participants can be substituted at any time.
The organizer reserves the right to cancel, reschedule, postpone or amend the course date/venue/programme, due to unforeseen circumstances.

ORGANISED BY: MALAYSIAN IRON AND STEEL INDUSTRY FEDERATION (MISIF)
SUPPORTED BY: SOUTH EAST ASIA IRON & STEEL INSTITUTE (SEAISI)

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Course Series No.: 10001616747

DATE AND VENUE
Date: **25-26 November 2025 (Tuesday-Wednesday)**
Time: **9.00 a.m. – 5.30 p.m. (Daily)**
Venue: **MISIF Training Room, Shah Alam, Selangor**

SKIM BANTUAN LATIHAN
Companies registered with HRD Corp can apply for refund under HRD Corp Claimable Course Scheme (formerly known as SBL Khas)

ABOUT THE TRAINERS (HRDC Certified Trainers):

Assoc. Prof. Dr. Nurulakmal Mohd Sharif joined USM Engineering Campus in 2001 after completing her PhD in Materials Engineering (Metallurgy) from University of Wales Swansea, United Kingdom. She is currently an Assoc. Professor at School of Materials & Mineral Resources Engineering, USM. She has obtained several grants from USM, JICA, MOHE, MOSTI and CREST to develop alloys for high temperature application, metal composites, development of lead-free solder alloy and metal ternary / composite coating. She was a member of the MLVK advisory board (Steel making & Foundry) (2007), MARA advisory board (Electroplating Technology Certificate and Diploma in Foundry) (2011) and also has conducted many training courses for MISIF, Intel, KOBE Precision, Kilang Sprocket, AT & S, and others. Consultation works include heat treatment on steel, microstructure studies and recycling of solid waste into valuable product.

Assoc. Prof. Ts. Ir. Dr. Anasyida Abu Seman is a lecturer at School of Materials and Mineral Resources Engineering, USM Engineering Campus since 2010. She has completed her PhD in Materials Science from Universiti Kebangsaan Malaysia. Her research interest includes casting, severe plastic deformation, metal coating, welding, wear and soldering. Previously she worked as senior process engineer in Flex (formerly known as Solectron) for about 6 years. She has obtained several grants from USM, MOHE, AUNSEED/Net and MOSTI to develop aluminium composite, semi-solid aluminium alloy, friction stir welding, and ultrafine grained structure for aluminium and steel. In term of supervision, she graduated 18 postgraduate students as main and co-supervisor. She also actively giving technical talk to several industries such as Southern Steel, Kobe and MISIF.

REGISTRATION FORM

Please register the following person/s for the **"Training Course":**
FEE: MEMBERS: RM1,500 PER PARTICIPANT
NON-MEMBERS: RM1,700 PER PARTICIPANT

PLEASE TYPE IN BLOCK LETTERS:-

1. **NAME:** _____ **DESIGNATION:** _____
   EMAIL: _____ **TEL NO:** _____
2. **NAME:** _____ **DESIGNATION:** _____
   EMAIL: _____ **TEL NO:** _____
3. **NAME:** _____ **DESIGNATION** _____
   EMAIL: _____ **TEL NO:** _____

SUBMITTED BY: _____

DESIGNATION: _____ **EMAIL ADDRESS:** _____

COMPANY NAME: _____ **TEL NO:** _____

ADDRESS:

FOR INFORMATION
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