

Duration: 5 Days

Fees: 39,000 Baht/ Person\*

Training Session:

18 – 22 December 2017 (Bangkok)

**Suitable for:**

Technicians and Engineers facing metallurgical issues engendered by the welding process. To attend this course, it is preferable to have acquired basic knowledge in metallurgy and to master the major concepts of welding.

**Objectives:**

At the end of the course, you will be able:

- To identify the welding factors which affect the metallurgical properties of welded joints
- To define how these factors affect the metallurgical properties of welded joints
- To assess the risks associated to the welding of non-alloy steel (cracking, deterioration of the properties...)
- To assess the risks associated to the welding of low-alloy steels
- To assess the risks associated to the welding of high-alloy steels
- To assess the risks associated to the welding of heterogeneous steels from different grades
- To optimize the welding procedures to the metallurgical risks here above mentioned

**Content:****INTRODUCTION TO WELDABILITY**

- Basics of weldability
- Requirements for welding
- Metallurgical effects

**THERMAL EFFECTS OF WELDING**

- Cycle and heat diffusion
- Comparison of welding processes
- Influence of welding parameters

**STRUCTURAL CHANGES IN THE HEAT AFFECTED ZONES (HAZ)**

- Effects of welding thermal cycle
- Metallurgical effects

**THE FUSION ZONE**

- Behaviour of the base metal and filler metal
- Influence of welding gases and welding slag

**WELDABILITY OF NON ALLOY STEELS**

- Solidification structures
- Regeneration in multiple pass welding
- Formation of blow holes and solutions

**WELDABILITY OF NON OR LOW-ALLOY**

- Cold cracking
- Aging
- Lamellar tearing
- Re-heating cracking
- Case studies
- Methods of selection of the welding procedures

**WELDABILITY OF HIGH ALLOY STEELS**

- Reminders of the general characteristics of stainless steels
- Weldability of martensitic steels
- Weldability of ferritic steels
- Weldability of austenitic steels
- Weldability of austenitic-ferritic steels
- Case studies

**HETEROGENEOUS JOINTS**

- Welding or filling with dissimilar steels
- Methods selection of the welding procedures

**TECHNICAL ASPECTS OF METALLOGRAPHY**

- Sampling
- Preparation methods and related effects

**METALLURGY: A BRIEF OUTLINE****CASE STUDIES***Macroscopic examination of welds*

- Comparison of different welding procedures
- Comparison of different welding metals
- Information about the metal characteristics of welded joints
- Identification of the welding defects

*Microscope examination of the material structural evolutions and cracking phenomena consecutive to welding*

- Non-alloy steel welds
- Low-alloy steel welds
- Martensitic stainless steel welds
- Ferritic stainless steel welds
- Austenitic Stainless steel welds
- Duplex steel welds

\* Excluding VAT - Published prices and schedules are subject to change without advance notification

\* Registration fees are inclusive of lunch and coffee breaks