Chemical, Mechanical Engineering

SCANDINAVIAN ACADEMY
Training and Development

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Course: Welding Technology: Welding, Fabrication and Inspection (AWS, ASME and API Codes)

Code	City	hotel	Start	End	price	Hours
555	Florence (Italy)	Hotel Meeting Room	2024-04-08	2024-04-12	5450 €	25

Course Description

Welding Technology plays a major role in all maintenance and fabrication activities in the industry. Production equipment, a highly sophisticated welding technique and qualified personnel allow processing or production of steel products for different applications within short periods. This seminar provides a much needed source of authoritative information on the complex subject of welding. It provides a comprehensive run-down of the complex science of welding- processes, selection of power sources, weld metallurgy, weldability of metals, testing and inspection techniques.

The seminar will cover welding processes, welding consumables, design of welded joints, applied welding metallurgy and heat treating, welding quality control, non-destructive testing and major International Welding Codes and Standards such as AWS and API.

Each session will be conducted in a lecture/discussion format and videos designed to provide intensive instruction and guidance. The director will be available following each day’s session to provide participants with further opportunity for discussion and consideration of specific problems.

Course Objective

Upon the successful completion of this seminar, the participants should be able to:

- Identify the tools and techniques associated with welding-related fabrication and quality control.
- Point out practical aspects of fabrication and inspection which should be taken into consideration in the design of equipment.
- Monitor fabrication and erection plans and incorporate some quality control requirements into contractual documents.
- Achieve economical compliance with ASME, AWS and API Standards when writing and qualifying welding and brazing procedures.
- Gain insights into ASME Code, AWS and API Standards to facilitate interpreting, understanding and complying with Standards.
- Review welding processes, common variables and basic welding metallurgy.
- Find out how to qualify welders and brazers the easy way.
- Writing and qualifying welding procedures that comply with ASME Code, AWS and API Standards with an in-depth understanding of the requirements.

- Understand and examine the requirements for welder and operator qualification in details and in an easy way.
- Select test coupons to minimize overall cost of qualification and writing WPSs so that optimum flexibility is achieved

Who Should attend?

Inspection engineers, Mechanical Engineers, Electrical Engineers, NDT personnel, quality assurance personnel, auditors, testing laboratory personnel, and maintenance personnel. Further, this seminar is a must for anyone involved in inspection of welding construction, qualifying welders, brazers and operators; or other involved in writing and qualifying welding and brazing procedure specifications; those responsible for reviewing supplier procedures, auditing or reviewing in-house procedures and qualifications; and those who estimate jobs where compliance of ASME code.

Course Outline

Day 1

Registration & Coffee

Welcome & Introduction

Welding Processes

- Fundamentals
- SMAW (Shielded Metal Arc)
- GTAW (Gas Tungsten Arc)
- GMAW (or MIG) (Gas Metal Arc)
- FCAW (Flux Cored Arc)

SAW (Submerged Arc)

Classification of Arc Welding Consumables

- Coated Electrodes

- GMAW and GTAW Wires
- FCAW Wires
- Sub Arc Wires and Fluxes
- Neutral and Active Fluxes
- Shielding Gases

Day 2

Introduction to Properties of Materials

- Strength of Materials
- Material Properties
- Destructive Testing

Fatigue of Welded Structures

- Fatigue mechanisms
- Weld finish classifications

Joint Designs

- Joints
- Symbols

- Design for Productivity

Dissimilar Welds and Weld Overlays

Day 3

Metallurgical Properties of Steel & Heat Treatment

- Metallurgical Properties of Steel
- Preheating
- Post Weld Heat Treatment (PWHT)
- Field Heat Treating Equipment
- Plans for PWHT

Welding Quality Control

- Planning for QC
    - Welding Problems and Defects
    - Visual Inspection
    - Employment of NDT
    - Welder Training & Qualification
- CSWIP vs. ASNT qualification

API 1104 and AWS D1.1: History and Structure

- Historical Development of AWS D1.1 and API 1104
- Pre-Qualification and Qualification of Welding Procedures
- The use of Pre-qualified procedures
- Base Metal Classifications to AWS and API

ASME Code, History and Structure

- **Historical Development of Section IX**
- **Relationship of Section IX to Other Codes (ASME V111 and B31.3)**
- **Organization, Structure and Mechanics of Using Section IX – Essential, Non-Essential and Supplemental Essential Variables**

Day 4

ASME Section IX: Base and Filler Metal Specifications

- **P numbers and Base Metal Classifications**
- **F-numbers**
- **A-numbers**
- **SFA and Non-SFA filler metal specifications**

The use of Standard Welding Procedures

ASME Section IX: Selecting and preparing the test coupon for both procedure and Welder qualifications.

- **Obtaining maximum cost-effectiveness from test coupons**
- **Preparation and welding of the test coupon**
- **Recording both necessary and worthwhile data**
- **Demonstrating code compliance**

ASME Section IX: Writing Welding Procedure Specification

- Meeting code requirements
- Addressing customer requirements
- Providing direction to the welder
- Sources of information for preparing intelligent and meaningful welding procedure specifications

ASME Supplemental Va

riables – special consideration for notch-toughness

- **How welding influences toughness**
- **Toughness requirements of construction codes**
- **Measuring and recording heat input data**
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- **Translating heat input data into useful directions for a welder**
- **Typical construction code requirements**

Day 5

Welding Safety

- Electric Shock
- Radiation
- · Fire and explosions
- Eye injuries
- Fume
- Hearing impairment

Procedure Specification

- Use of Section IX form
- Other Formats
- Procedure qualification record forms
- Revisions to records and procedures

Procedure Specification

- Use of Section IX form
- Other Formats
- Procedure qualification record forms
- Revisions to records and procedures
- Take-home test

ASME Brazing Qualifications

- Brazing process and variables
- Differences between QW and QB Sections
- Preparation of the Brazing Procedure Specification

ASME Brazing Qualifications (cont'd)

- Qualification of the brazing procedure
- Types of tests
- Qualification of brazers and brazing operators

The Scandinavian Academy employs modern methods in training and skills development, enhancing the efficiency of human resource development. We follow these practices:

- **Theoretical Lectures:**
  - We deliver knowledge through advanced presentations such as PowerPoint and visual materials, including videos and short films.
- **Scientific Assessment:**
  - We evaluate trainees skills before and after the course to ensure their progress.
- **Brainstorming and Interaction:**
  - We encourage active participation through brainstorming sessions and applying concepts through role play.
- **Practical Cases:**
  - We provide practical cases that align with the scientific content and the participants specific needs.
- **Examinations:**
  - Tests are conducted at the end of the program to assess knowledge retention.
- **Educational Materials:**
  - We provide both printed and digital scientific and practical materials to participants.
- **Attendance and Final Result Reports:**
  - We prepare detailed attendance reports for participants and offer a comprehensive program evaluation.
- **Professionals and Experts:**
  - The programs scientific content is prepared by the best professors and trainers in various fields.
- **Professional Completion Certificate:**
  - Participants receive a professional completion certificate issued by the Scandinavian Academy for Training and Development in the Kingdom of Sweden, with the option for international authentication.
- **Program Timings:**
  - Training programs are held from 10:00 AM to 2:00 PM and include buffet sessions for light meals during lectures.