INDEPENDENT TRAINING MANAGEMENT

WELDING METALLURGY AND WELDABILITY

LIVE ONLINE TRAINING | 23 – 24 MARCH 2026

This course helps students develop an understanding of basic metallurgical principles as they apply to fusion welding to improve the quality of workmanship in the field of welding. Welding Metallurgy covers process, physical and mechanical properties, metal identification, carbon equivalency, selection of filler metal based on the parent metal, heat input, and the effects of heat on the weld zone along with the properties of heat treatment and stress relieving applications within the welding field. A study of ferrous and nonferrous metals from the ore to the finished product. Emphasis on metal alloys, heat treating, hard surfacing, welding hardness, machinability, and ductility

After Attending This Course You Will Be Able To

- Define the practical applications of metallurgy.
- Identify fundamental principles and practices of welding metallurgy.
- Identify the composition and classification of base metals.
- Explain the physical characteristics and mechanical properties of metals.
- Identify grain structures and hard facing of a weldment.
- Demonstrate field identification methods for base metals.
- Demonstrate preheat, post heat and post weld heat treatment of metals.
- Identify hydrogen cracking and the effects of welding on metals.

WHO SHOULD ATTEND

- Welding Managers
- Welding inspection personnel
- Welding supervisor personnel
- Project/Design Engineers
- Metallurgists
- Quality Control Technicians
- Quality Assurance Personnel
- Sales Professionals
- Purchasing Agents
- Project Managers/ Supervisors
- All personnel involved with welded fabrication

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Special welding processes

- Describe the various special welding processes.
- Identify and specify these special welding processes using AWS abbreviations.
- Identify equipment that is used with many of the special welding processes.

Special ferrous welding applications

- Define low-, medium-, and high-carbon steel.
- Describe preheat, inter pass heat and post heat treatment and why is each done.
- Describe the proper procedure for welding stainless steel, tool steel, and cast iron.

Special nonferrous welding applications

- Define a nonferrous metal and alloy.
- Discuss how to weld both wrought and cast aluminium
- Describe how to GTAW brass, titanium, and other nonferrous metals.
- Identify the equipment that makes up a plastic welding station.

Special Cutting Processes

- Identify various cutting processes by AWS abbreviations.
- Explain when a particular cutting process would be pick over another.
- List safety hazards involved when using the cutting processes.

Metal Surfacing

- Define the term surfacing.
- Define thermal spraying.
- Define hard facing, cladding, buttering, and buildup.

Metal Properties and identification

- List and describe eight physical properties of metal
- Identify cast iron, plain carbon steel, and alloy steel by making a spark test on a grinder using comparison charts.

Heat treatment of metals

- List seven reasons to heat treatments.
- Name the methods used to heat metals for heat treatment.
- Describe the weld heat-affected zone.
- Define and discuss annealing, normalizing, tempering and hardening.

Hot Cracking

- Weld Solidification Cracking
- Liquation Cracking
- weld metal Liquation Cracking
- Variables that Influence Susceptibility to Liquation Cracking
- Preventing Liquation Cracking

Solid-State Cracking

- Ductility-dip Cracking
- Reheat Cracking
- Reheat Cracking in Low-Alloy Steels
- Reheat Cracking in Stainless Steels
- Underclad Cracking
- Relaxation Cracking
- Identifying Reheat Cracking
- Preventing Reheat Cracking
- Strain-age Cracking
- Identifying Strain-age Cracking
- Preventing Strain-age Cracking
- Lamellar Cracking
- Identifying Lamellar Cracking
- Preventing Lamellar Cracking
- Copper Contamination Cracking
- Identifying Copper Contamination Cracking
- Preventing Copper Contamination Cracking

Failure Analysis

- Fracture Modes
- Sample Removal and Testing Protocol
- Sample Removal Cleaning and Storage
- Chemical Analysis
- Mechanical Testing
- Nondestructive Evaluation Techniques
- Structural Integrity Assessment

Weldability Testing

- Types of Weldability Test Techniques
- The Varestraint Test
- Technique for Quantifying Weld Solidification Cracking
- The Cast Pin Tear Test
- The Hot Ductility Test
- The Strain-to-Fracture Test
- Reheat Cracking Test

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R 8 999 PER DELEGATE

Booking Contact (Approving Official) Mr/Mrs/Ms

Full Names: _____

Company name: _____

Direct Tel No: _____ E-mail: _____ Fax: _____

VAT No: _____

Address: _____

Signature_____

Person Responsible for Finance: _____**Direct Tel No:** _____ **Date of Payment:**_____

BANKING DETAILS:

Independent Training Management Pty Ltd
Bank: FNB South Africa
Account Number: 62685879276
Branch Code: 251650
Branch: Randburg

THIS INVESTMENT INCLUDES:

THE FOLLOWING HEREBY CONFIRM ATTENDANCE TO THE WORKSHOP

Delegate1: Names_____

Position: _____ E-Mail: _____

Delegate 2: Names _____

Position: _____E-Mail: _____

Delegate 3: Names _____

Position: _____ E-Mail: _____

Delegate 4: Names _____

Position: _____ E-Mail: _____

Delegate 5: Names _____

Position: _____ E-Mail: _____

All fees are current at the time of going to print; however, we reserve the right to change them.

2. Additional Delegate Rates:

Additional delegate rates apply when bookings are made at the same time on the same course.

3. Confirmation Instructions:

On receipt of this submitted booking form and payment or purchase order you will receive a confirmation letter by email confirming your participation in the training event. This includes a location map with directions and venue details and starting times.

4. Attendance:

Please note that no learner will be permitted to attend any training course without proof of payment or an order no.

5. Delegate Substitution:

Substitutes can be made at any time without incurring a penalty. Please inform us in writing so we can make the necessary arrangements for the new learner.

6. Payment:

Payment can be made by cheque or by electronic transfer, and must be received 5 working days prior to the commencement of the course.

Please quote the reference number from your invoice and organisation name so that payments can be tracked. All cancellations must be done in writing and emailed directly to Independent Training. Management Inform us immediately if you have to re-schedule or cancel the booking so that we can inform the caterers and conference venue.

The following charges apply if you cancel:

- 11 - 30 days before a course = 10% of the course fee
- 6 – 10 days before a course = 20% of the course fee
- 4 – 6 days before a course= 30% of the course fee
- 1-3 days before a course = 50% of the course fee