



Accredited Africa Training Institute for Capacity Development

Unit FO409, Hatfield Plaza · 1122 Burnett St, Hatfield 0028 · Pretoria, Gauteng · South Africa

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COURSE BROCHURE

Gold Smelting Process Control Metallurgical Plant Operations Training

Manufacturing, Engineering and Technology / Fabrication and Extraction

Unit Standard 110398 · NQF Level 4 · 13 Credits · 10 Days

COURSE OVERVIEW

This course equips learners with the advanced skills required to control and optimise gold smelting processes in a metallurgical plant. It focuses on process control parameters, safety protocols, and quality assurance to ensure efficient and compliant gold production. Learners will gain the competence to monitor, adjust, and troubleshoot smelting operations while adhering to industry standards.

Category	Manufacturing, Engineering and Technology
Subfield	Fabrication and Extraction
Unit Standard	110398
Accreditation	SAQA Accredited · NQF Level 4 · 13 Credits
Duration	10 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Apply gold smelting process control principles to monitor and adjust furnace operations.
- Analyse process data and implement corrective actions to maintain optimal smelting conditions.
- Evaluate safety and environmental hazards associated with gold smelting and implement control measures.
- Demonstrate proficiency in using process control instruments and interpreting readings.
- Implement quality assurance procedures to ensure the purity and yield of gold output.
- Design troubleshooting strategies for common smelting process deviations.

WHO SHOULD ATTEND

- This training is designed for metallurgical plant operators, process controllers, and supervisors involved in gold smelting operations.
- It is also suitable for technicians and engineers seeking to deepen their understanding of smelting process control.

COURSE OUTLINE

Day 1: Introduction to Gold Smelting and Plant Safety

- Overview of gold extraction and smelting processes
- Importance of smelting in gold recovery
- Plant safety induction: PPE, emergency procedures, and hazard identification
- Environmental management and waste handling in smelting
- Introduction to smelting plant equipment: furnaces, crucibles, and moulds
- Basic metallurgical terminology and principles

Day 2: Chemistry of Gold Smelting and Flux Formulation

- Gold smelting chemistry: oxidation, reduction, and slag reactions
- Flux types: borax, silica, soda ash, and their functions
- Flux formulation principles and stoichiometry
- Behavior of base metals and impurities
- Slag characteristics and removal techniques

Day 3: Furnace Operations and Temperature Control

- Furnace types: electric arc, induction, and gas-fired furnaces
- Temperature measurement: thermocouples, pyrometers, and control systems
- Heating cycles and energy management
- Furnace refractory maintenance and lining inspection
- Troubleshooting temperature deviations and equipment faults

Day 4: Charging and Melting Procedures

- Feed preparation: drying, weighing, and blending
- Charging sequences for different furnace types
- Material handling equipment: conveyors, hoppers, and ladles
- Melting stage observation: bath behavior and sampling
- Safety during charging: spill prevention and fume control

Day 5: Slag Handling, Tapping, and Gold Recovery

- Slag tapping: timing, tools, and safety
- Slag cooling, crushing, and re-processing
- Gold bullion pouring: mould preparation and casting
- Sampling and assaying of bullion and slag
- Mass balance and recovery efficiency calculations

Day 6: Process Control Parameters and Instrumentation

- Critical parameters: temperature, residence time, and flux ratio
- Instrumentation: sensors, transmitters, and PLC systems
- Process control loops and automation basics
- Data logging and trend analysis
- Adjusting parameters for varying feed compositions

Day 7: Quality Assurance and Bullion Refining

- Bullion quality standards: fineness, impurities, and weight
- Refining processes: chlorination and electrolytic refining
- Sampling techniques for bullion and slag

- Fire assay principles and calculations
- Documentation and traceability in quality control

Day 8: Maintenance, Troubleshooting, and Safety Systems

- Preventive maintenance: furnace, crucible, and mould care
- Common issues: slag buildup, refractory wear, and blockages
- Troubleshooting methodology and root cause analysis
- Safety systems: gas detection, ventilation, and fire suppression
- Lockout/tagout procedures and confined space entry

Day 9: Environmental Compliance and Waste Management

- Regulatory framework: NEMA, water and air quality acts
- Waste classification: hazardous vs. non-hazardous
- Dust and fume control: baghouses, scrubbers, and ventilation
- Water management and effluent treatment
- Environmental impact assessments and reporting

Day 10: Integrated Plant Operations and Process Optimization

- Plant-wide process flow and material balance
- Optimization strategies: temperature, flux, and cycle time
- Production planning and scheduling
- Key performance indicators: recovery, energy consumption, and downtime
- Case studies and continuous improvement principles

ASSESSMENT & CERTIFICATION

Delegates are assessed through exercises and a final test. A mark of **50% or above** earns an **AATICD Certificate of Completion**, issued digitally with a unique verification code. This course carries **13 NQF credits** at **NQF Level 4**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 35,800.00	R 35,800.00
1	In-House	R 46,500.00	R 46,500.00
1	On-Campus (Pretoria)	R 53,700.00	R 53,700.00

UPCOMING SESSIONS

Start	End	Method	Venue
04 Aug 2026	17 Aug 2026	On-Campus	Mauritius
05 Aug 2026	18 Aug 2026	On-Campus	Cape Town, South Africa
06 Aug 2026	19 Aug 2026	On-Campus	Dubai, UAE
07 Aug 2026	20 Aug 2026	On-Campus	Pretoria, South Africa
07 Aug 2026	20 Aug 2026	On-Campus	Lagos, Nigeria
10 Aug 2026	21 Aug 2026	On-Campus	Durban, South Africa
10 Aug 2026	21 Aug 2026	On-Campus	Mauritius
11 Aug 2026	24 Aug 2026	On-Campus	Cape Town, South Africa

Contact us if no suitable date is listed – on-demand sessions can be arranged for groups.

HOW TO GET A QUOTE OR APPLY

1. **Get an instant quotation online:** visit www.aaticd.co.za, open the page for this course (Unit Standard 110398) and click **Get A Quote / Apply**. Select your training method and number of delegates – your quotation is generated immediately and emailed to you with the course brochure attached.
2. **Apply by email:** send the course title, your preferred training method (Online, In-House or On-Campus Pretoria), the number of delegates and your preferred dates to apply@aaticd.co.za – our team will reply with a formal quotation.
3. **Apply by phone or WhatsApp:** call **+27 12 004 8389** or WhatsApp **+27 65 077 6310** and we will prepare your quotation and reserve your seats.
4. **Confirm your booking:** accept the quotation and settle the invoice. As soon as payment is confirmed your delegates are enrolled and receive their AATICD LMS login details by email, along with joining instructions for their chosen training method.

Group discounts apply automatically – the more delegates you enrol, the lower the price per delegate. No payment is required to request a quotation.

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