



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

Laser Inscription Techniques For Polished Diamonds Training

Manufacturing, Engineering and Technology / Fabrication and Extraction

Unit Standard 110227 · NQF Level 3 · 22 Credits · 19 Days

COURSE OVERVIEW

This course equips learners with the skills to inscribe polished diamonds using laser technology, ensuring compliance with industry standards and quality assurance protocols. Participants will master the technical procedures for laser inscription, including setup, operation, and safety measures, to enhance diamond traceability and value. The training also covers verification techniques to confirm inscription accuracy and integrity.

Category	Manufacturing, Engineering and Technology
Subfield	Fabrication and Extraction
Unit Standard	110227
Accreditation	SAQA Accredited · NQF Level 3 · 22 Credits
Duration	19 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Apply laser inscription techniques to polished diamonds according to industry specifications.
- Demonstrate safe operation of laser inscription equipment and adherence to safety protocols.
- Evaluate inscription quality using magnification and verification tools.
- Implement record-keeping procedures for traceability and quality assurance.
- Analyze diamond characteristics to determine appropriate inscription parameters.
- Maintain and troubleshoot laser inscription equipment to ensure consistent performance.

WHO SHOULD ATTEND

- This course is designed for diamond graders, polishers, and quality control personnel in the diamond industry who are responsible for laser inscription of polished diamonds.
- It is also suitable for technicians seeking to upgrade their skills in precision laser operations.

COURSE OUTLINE

Day 1: Introduction to Diamond Inscription and SAQA Framework

- Overview of diamond grading and certification
- Role of inscription in traceability and branding
- SAQA unit standard 110227 learning outcomes
- Laser inscription versus engraving
- Industry standards (GIA, HRD, IGI)
- Safety and ethical practices

Day 2: Laser Physics and Safety Fundamentals

- Laser types: CO2, Nd:YAG, fiber
- Laser parameters and their effects
- Laser safety classifications
- Personal protective equipment (PPE)
- Emergency procedures
- Laser beam delivery systems

Day 3: Diamond Properties Affecting Inscription

- Diamond crystallography and cleavage
- Optical properties: refractive index, dispersion
- Fluorescence and phosphorescence
- Impact of inclusions on laser marking
- Diamond hardness and thermal properties
- Pre-inscription inspection techniques

Day 4: Laser Inscription Equipment Overview

- Laser sources: DPSS, fiber, UV
- Optical components: mirrors, lenses, scanners
- Workstation layout and ergonomics
- Cooling systems (chiller, air)
- Exhaust and fume extraction
- Routine maintenance schedules

Day 5: Software and Control Systems

- Software overview (e.g., Marking Mate, LightBurn)
- Vector vs. raster marking
- Font selection and text formatting
- Parameter tables for different diamond grades
- File formats and import/export
- Job logging and data management

Day 6: Inscription Techniques – Surface Marking

- Surface marking principles
- Parameter optimisation for clarity
- Mark depth control
- Common defects: burning, chipping
- Cleaning after marking

- Quality inspection criteria

Day 7: Inscription Techniques – Internal Marking (Laser-Induced)

- Internal marking physics
- Focal point positioning
- Pulse energy and repetition rate
- Mark readability vs. diamond clarity
- Post-marking verification
- Limitations of internal marking

Day 8: Inscription of Barcodes and Data Matrix Codes

- 2D code standards for diamonds
- Code generation software
- Parameter tuning for code density
- Scanner compatibility testing
- Data encryption considerations
- Batch and serial number coding

Day 9: Inscription on Fancy Shapes and Small Diamonds

- Challenges with princess, marquise, heart cuts
- Fixture design for non-round stones
- Small stone handling tools
- Reduced laser power for small surfaces
- Inspection under magnification
- Case studies

Day 10: Quality Control and Verification

- Inspection equipment: microscopes, profilometers
- Depth measurement techniques
- Contrast and readability grading
- Defect classification (burn, crack, incomplete)
- Documentation and reporting
- Statistical process control basics

Day 11: Maintenance and Troubleshooting

- Cleaning optics and lenses
- Beam alignment procedures
- Troubleshooting power drop
- Replacing laser tubes/diodes
- Software error recovery
- Preventive maintenance schedule

Day 12: Advanced Techniques – Multi-line and Gradient Inscription

- Multi-layer marking strategies
- Variable power and speed profiles
- Gradient generation software
- Design rules for complex marks
- Time optimisation
- Examples: logos, serial numbers

Day 13: Inscription for Certification and Traceability

- GIA inscription guidelines
- HRD and IGI standards
- Database integration
- Barcode and QR for traceability
- Audit trails
- Case study: laser marking for Kimberley Process

Day 14: Automation and High-Volume Production

- Automated loaders and conveyors
- Batch job programming
- Cycle time reduction
- Inline inspection systems
- Production data analysis
- Lean manufacturing principles

Day 15: Special Applications – Personalisation and Branding

- Personalisation software
- Logo vectorisation
- Font licensing
- Customer approval process
- Brand protection features
- Microtext and security marks

Day 16: Health, Safety and Environmental Compliance

- OHS Act and laser safety regulations
- Hazardous substances (fumes)
- Waste disposal (coolants, filters)
- Risk assessment methodology
- Fire safety and suppression
- Incident reporting

Day 17: Industry Trends and Emerging Technologies

- Femtosecond laser advantages
- UV laser for ultra-fine marking
- Blockchain for diamond provenance
- AI-based quality inspection
- Industry 4.0 integration
- Research and development updates

Day 18: Practical Assessment Preparation

- Recap of key techniques
- Mock assessments
- Time management during marking
- Error correction strategies
- Documentation practice
- Q&A; session

Day 19: Final Assessment and Course Wrap-Up

- Written exam (theory)
- Practical test (inscription and QC)
- Assessment debrief
- Certification issuance
- Career pathways
- Course evaluation

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 **22 NQF credits** at **NQF Level 3**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 58,900.00	R 58,900.00
1	In-House	R 76,600.00	R 76,600.00
1	On-Campus (Pretoria)	R 88,400.00	R 88,400.00

UPCOMING SESSIONS

Start	End	Method	Venue
06 Aug 2026	01 Sep 2026	On-Campus	Dubai, UAE
07 Aug 2026	02 Sep 2026	On-Campus	Pretoria, South Africa
07 Aug 2026	02 Sep 2026	On-Campus	Lagos, Nigeria
10 Aug 2026	03 Sep 2026	On-Campus	Durban, South Africa
10 Aug 2026	03 Sep 2026	On-Campus	Mauritius
11 Aug 2026	04 Sep 2026	On-Campus	Cape Town, South Africa
12 Aug 2026	07 Sep 2026	On-Campus	Dubai, UAE
13 Aug 2026	08 Sep 2026	On-Campus	Pretoria, 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 110227) 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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