Accredited Africa Training Institute for Capacity Development
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COURSE BROCHURE

Laser Drilling Quality Evaluation For Polished Diamonds Training

Manufacturing, Engineering and Technology / Fabrication and Extraction

Unit Standard 115780 · NQF Level 4 · 39 Credits · 36 Days

COURSE OVERVIEW

This course equips learners with the skills to evaluate laser drilling quality in polished diamonds, ensuring that treatments are disclosed accurately and meet industry standards. It covers assessment criteria, documentation, and ethical considerations in diamond grading.

Category	Manufacturing, Engineering and Technology
Subfield	Fabrication and Extraction
Unit Standard	115780
Accreditation	SAQA Accredited · NQF Level 4 · 39 Credits
Duration	36 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS — verifiable online

LEARNING OUTCOMES

- Apply SAQA-aligned criteria to evaluate laser drilling quality in polished diamonds.
- Analyze laser drilling features to determine their impact on diamond clarity and value.
- Evaluate the ethical and legal implications of laser drilling disclosure.
- Document laser drilling assessments accurately using industry-standard terminology.
- Implement quality control procedures consistent with diamond grading best practices.
- Demonstrate proficiency in using magnification tools and lighting for drilling evaluation.

WHO SHOULD ATTEND

- Diamond graders, quality controllers, and jewelry professionals responsible for evaluating and documenting laser drilling in polished diamonds.

COURSE OUTLINE

Day 1: Introduction to Laser Drilling in Diamond Processing

- Overview of polished diamond grading and quality factors
- History and evolution of laser drilling in the diamond industry
- Basic physics of laser interaction with diamond
- Types of lasers used (e.g., Nd:YAG, CO2
- Safety standards and personal protective equipment (PPE
- Regulatory framework in South Africa (SAQA, Diamond Board
- Course outcomes and unit standard alignment

Day 2: Diamond Clarity and Inclusion Types

- Diamond formation and inclusion origins
- Inclusion types: crystals, feathers, clouds, needles, etc.
- Clarity grading scales (GIA, IDC, SARB
- Impact of inclusion size, position, and colour on quality
- Criteria for selecting inclusions for laser drilling
- Practical exercises with inclusion identification using loupe and microscope

Day 3: Laser Drilling Techniques and Parameters

- Laser drilling setup: beam delivery, focusing optics, workpiece positioning
- Parameter selection for different inclusion types
- Pulse energy and repetition rate effects
- Cooling methods: air, water, or cryogenic
- Debris evacuation and re-deposition prevention
- Comparison with alternative techniques (e.g., conventional drilling, laser cutting
- Hands-on demonstration of laser drilling machine controls

Day 4: Quality Evaluation Criteria for Laser-Drilled Diamonds

- Hole geometry: diameter consistency, circularity, straightness
- Surface roughness and heat-affected zone (HAZ
- Micro-crack formation and propagation
- Clarity impact: removal of inclusion vs. new features
- Standards and tolerances (e.g., from De Beers, AWDC
- Quality control checklists
- Case studies of acceptable vs. rejected drilling

Day 5: Inspection Equipment and Techniques

- Types of microscopes: stereo, metallurgical, confocal
- Measurement reticles and digital callipers
- Image capture and analysis software
- Lighting techniques: bright-field, dark-field, polarised
- Calibration standards and traceability
- Practical session: inspecting pre-drilled samples
- Maintenance and cleaning of optical components

Day 6: Non-Destructive Testing Methods

- Principles of NDE in diamond quality control

- UV fluorescence: colour and intensity indicators
- Cathodoluminescence for defect mapping
- Micro-CT and X-ray radiography basics
- Photoluminescence spectroscopy for stress analysis
- Advantages and limitations of each method
- Hands-on: UV lamp and spectrometer use

Day 7: Evaluating Structural Integrity After Drilling

- Stress concentration around holes
- Photoelastic analysis using polariscope
- Fracture mechanics basics for diamond
- Impact of drilling on diamond toughness
- Annealing and stress relief techniques
- Case studies: structural failures due to poor drilling
- Practical: stress evaluation of drilled samples

Day 8: Impact on Diamond Grading and Value

- Clarity grade changes: before and after drilling
- Value factors: size, colour, clarity, and treatment
- Disclosure protocols in the diamond industry
- Market perception and pricing trends
- Legal implications of non-disclosure
- Role of grading laboratories (GIA, HRD, IGI
- Workshop: value estimation of drilled diamonds

Day 9: Advanced Laser Drilling: Multi-Hole and Complex Patterns

- Strategies for drilling multiple inclusions
- Inter-hole spacing and stress interaction
- CNC programming for automated drilling
- Simulation tools for stress prediction
- Case studies: complex inclusion removal
- Quality evaluation of multi-hole diamonds
- Practical: programming a simple multi-hole pattern

Day 10: Quality Assurance and Control Systems

- Elements of a QA system (ISO 9001 principles
- SPC basics: mean, range, standard deviation
- Control charts for hole diameter and depth
- Defect categorisation and Pareto analysis
- Corrective and preventive actions (CAPA
- Audit trails and documentation
- Workshop: creating a control chart for drilling data

Day 11: Documentation and Reporting

- Report structure: executive summary, methods, results
- Photography standards: magnification, scale, lighting
- Data recording sheets for hole parameters
- Software for report generation (e.g., Excel, LIMS

- Confidentiality and data security
- Practical: writing a report for a drilled diamond
- Peer review of reports

Day 12: Environmental and Safety Management

- Laser classification and associated risks
- Fume extraction and filtration systems
- Disposal of diamond dust and contaminated materials
- OHS Act (South Africa) and laser safety standards
- Personal monitoring for laser exposure
- Emergency procedures and first aid
- Practical: risk assessment of a laser workstation

Day 13: Practical Sessions: Drilling and Inspection

- Setup and calibration of laser drilling equipment
- Drilling a single inclusion with predefined parameters
- Post-drilling inspection: visual, dimensional, stress
- Parameter adjustment based on initial results
- Common defects: taper, recast layer, cracking
- Record-keeping for each sample
- Debrief and discussion of outcomes

Day 14: Practical Sessions: Advanced Drilling Scenarios

- Planning a drilling sequence for 2-3 inclusions
- Executing the drilling with automated control
- Intermediate inspections between holes
- Final quality evaluation: clarity, stress, dimensions
- Comparison with single-hole results
- Problem-solving: unexpected inclusion behaviour
- Practical report writing

Day 15: Quality Evaluation of Laser-Drilled Diamonds in Industry Context

- Supply chain: miner, cutter, trader, retailer
- Industry standards and best practices
- Communication with graders, appraisers, and clients
- Dispute resolution: arbitration and certification
- Emerging technologies: femtosecond lasers, AI inspection
- Future trends in diamond treatment evaluation
- Guest lecture from industry expert (if available

Day 16: Integration of Evaluation with Diamond Manufacturing

- Process flow: rough diamond to polished
- Drilling stage placement (before/after bruting, polishing
- Impact of drilling on subsequent manufacturing steps
- Yield analysis: weight loss vs. value gain
- Inventory management systems for treated stones
- Quality gates: inspection points and sign-offs
- Case study: integrated production line

Day 17: Ethics, Disclosure, and Legal Compliance

- Ethics in gemstone treatment: transparency and honesty
- Disclosure laws in South Africa and major markets
- Kimberley Process Certification Scheme (KPCS
- Avoiding misleading descriptions (e.g., 'enhanced' vs. 'treated
- Handling returns and complaints
- Role of industry bodies (DMIA, IDMA
- Workshop: ethical scenarios and role-play

Day 18: Review and Mock Assessments

- Comprehensive review of theory: drilling, evaluation, QA
- Practical mock inspection of a drilled diamond
- Mock report writing with full documentation
- Multiple-choice and short-answer questions
- Group discussion of common mistakes
- Self-assessment and study plan for final day

Day 19: Final Assessment – Theory and Practical

- Written exam: 2 hours covering all topics
- Practical exam: drill and inspect a sample diamond
- Report writing: submit a detailed evaluation
- Oral questioning (if applicable
- Assessment criteria: accuracy, completeness, safety
- Time management during assessment

Day 20: Course Wrap-Up and Certification

- Feedback on assessment performance
- Certificate issuance (SAQA accredited
- Opportunities: advanced courses, specialisation
- Industry networking and mentorship
- Course evaluation questionnaire
- Closing remarks and distribution of resources
- Farewell

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 **39 NQF credits** at **NQF Level 4**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 102,400.00	**R 102,400.00**
1	In-House	R 133,100.00	**R 133,100.00**
1	On-Campus (Pretoria)	R 153,600.00	**R 153,600.00**

UPCOMING SESSIONS

Start	End	Method	Venue
05 Aug 2026	23 Sep 2026	On-Campus	Johannesburg, South Africa
06 Aug 2026	24 Sep 2026	On-Campus	Mauritius
07 Aug 2026	25 Sep 2026	On-Campus	Cape Town, South Africa
10 Aug 2026	28 Sep 2026	On-Campus	Pretoria, South Africa
11 Aug 2026	29 Sep 2026	On-Campus	Abu Dhabi, UAE
12 Aug 2026	30 Sep 2026	On-Campus	Durban, South Africa
12 Aug 2026	30 Sep 2026	On-Campus	Mauritius
13 Aug 2026	01 Oct 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 115780) 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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