



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

Polymer Composite Fabrication Quality Control Techniques Training

Manufacturing, Engineering and Technology / Manufacturing and Assembly

Unit Standard 110276 · NQF Level 4 · 24 Credits · 21 Days

COURSE OVERVIEW

This course equips learners with the knowledge and skills to implement and manage quality control techniques in polymer composite fabrication. Participants will learn to apply industry standards, conduct inspections, and ensure product conformity, enhancing operational excellence in composite manufacturing.

Category	Manufacturing, Engineering and Technology
Subfield	Manufacturing and Assembly
Unit Standard	110276
Accreditation	SAQA Accredited · NQF Level 4 · 24 Credits
Duration	21 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Apply quality control principles and techniques to polymer composite fabrication processes.
- Analyze defects and non-conformities in composite products to determine root causes.
- Evaluate test results and inspection data to ensure compliance with specifications.
- Implement corrective and preventive actions to improve product quality.
- Demonstrate proficiency in using quality control tools and equipment for composite materials.

WHO SHOULD ATTEND

- Quality assurance professionals, production supervisors, and technicians involved in polymer composite fabrication who seek to deepen their understanding of quality control processes.

COURSE OUTLINE

Day 1: Introduction to Polymer Composite Fabrication and Quality Control

- Overview of polymer composites: types, applications, and benefits.
- Introduction to fabrication processes: hand lay-up, spray-up, RTM, filament winding.
- Quality control fundamentals: definitions, standards, and objectives.
- Regulatory framework: SAQA, NQF, and relevant industry standards.
- Course structure, assessment criteria, and learning outcomes.

Day 2: Composite Materials and Their Properties

- Reinforcements: glass, carbon, aramid fibers – forms and properties.
- Resin systems: polyester, epoxy, vinyl ester – curing and performance.
- Core materials: foam, honeycomb, balsa – functions and selection.
- Material specification sheets and quality indicators.
- Common material defects: voids, dry spots, resin-rich areas.

Day 3: Fabrication Processes Overview

- Hand lay-up: process steps, advantages, and quality challenges.
- Spray-up: equipment, technique, and common defects.
- Resin transfer molding (RTM): process, tooling, and quality control points.
- Filament winding: machine setup, winding patterns, and quality criteria.
- Compression molding and pultrusion: principles and applications.

Day 4: Quality Control Planning and Documentation

- Elements of a quality control plan: scope, responsibilities, procedures.
- Documentation: work instructions, inspection reports, non-conformance reports.
- Traceability: batch numbering, material lot tracking, process logs.
- Quality standards: ISO 9001, AS9100, and composite-specific standards.
- Statistical process control (SPC) basics: control charts, capability.

Day 5: Inspection Techniques for Raw Materials

- Receiving inspection procedures: visual checks, certificates of conformance.
- Reinforcement testing: weight, weave density, moisture content.
- Resin testing: viscosity, gel time, reactivity, shelf life.
- Core material inspection: density, thickness, adhesion.
- Material storage and handling requirements to prevent degradation.

Day 6: Process Monitoring and Control

- Critical process parameters: temperature, humidity, pressure, cure time.
- Monitoring tools: thermocouples, pressure gauges, data loggers.
- Control methods: set points, alarms, automated adjustments.
- Process validation: first article inspection, capability studies.
- Corrective actions: root cause analysis, process adjustments.

Day 7: Non-Destructive Testing (NDT) Methods

- Visual inspection: criteria, lighting, magnification.
- Ultrasonic testing: pulse-echo, through-transmission, phased array.
- Radiography: X-ray and CT scanning for internal defects.
- Thermography: active and passive methods for delamination detection.

- Shearography and acoustic emission: applications and limitations.

Day 8: Destructive Testing Methods

- Mechanical testing: tensile, compression, flexural, shear (ASTM/ISO).
- Physical testing: density, fiber volume, void content (burn-off, acid digestion).
- Thermal testing: DSC, TGA for cure state and thermal stability.
- Specimen preparation: cutting, tabbing, conditioning.
- Data analysis: stress-strain curves, modulus calculation, failure modes.

Day 9: Defect Identification and Root Cause Analysis

- Defect classification: voids, delamination, wrinkles, porosity, fiber misalignment.
- Defect mapping: location, size, frequency.
- Root cause analysis tools: fishbone diagram, 5 Whys, fault tree.
- Case studies: typical defects in lay-up, RTM, and filament winding.
- Corrective actions: process adjustment, material change, rework procedures.

Day 10: Quality Assurance in Curing and Post-Curing

- Cure cycle design: temperature ramps, dwell times, cooling rates.
- Cure monitoring: degree of cure, exotherm, glass transition temperature.
- Post-curing: purpose, schedules, and impact on properties.
- Quality checks: hardness, surface finish, dimensional stability.
- Common curing defects: undercure, overcure, warpage.

Day 11: Dimensional Inspection and Tolerancing

- Measurement tools: calipers, micrometers, CMM, laser scanners.
- Datums and reference points: alignment and fixturing.
- Tolerancing: standard tolerances, statistical tolerancing.
- GD&T; symbols: flatness, parallelism, perpendicularity, profile.
- Reporting: inspection reports, pass/fail criteria, deviation analysis.

Day 12: Surface Quality and Finish Inspection

- Surface defects: pinholes, blisters, scratches, orange peel.
- Surface roughness measurement: Ra, Rz, profilometry.
- Visual standards: comparator plaques, lighting conditions.
- Coating and painting preparation: surface cleanliness, adhesion tests.
- Acceptance criteria: class A, B, C surfaces per industry standards.

Day 13: Quality Control for Bonded and Bolted Joints

- Bonded joints: surface preparation, adhesive application, cure.
- Bond inspection: tap test, ultrasonic, peel tests.
- Bolted joints: torque specification, fastener installation, hole quality.
- Joint failure modes: cohesive, adhesive, fastener shear.
- Quality records: bond logs, torque verification, pull-off tests.

Day 14: Environmental and Safety Compliance in QC

- Environmental regulations: NEMA, waste management, air quality.
- Safety in QC: PPE, chemical handling, ventilation.
- Hazardous materials: resins, solvents, dust – storage and disposal.
- Emission control: VOC monitoring, scrubbers, permits.
- Safety audits and incident reporting.

Day 15: Statistical Quality Control and Process Capability

- Descriptive statistics: mean, range, standard deviation.
- Control charts: X-bar and R, p-charts, c-charts.
- Process capability: Cp, Cpk, Pp, Ppk – interpretation.
- Sampling plans: AQL, lot acceptance, ANSI/ASQ standards.
- Software tools: Excel, Minitab for QC data analysis.

Day 16: Quality Management Systems and Auditing

- QMS framework: ISO 9001, AS9100, NADCAP.
- Documentation: quality manual, procedures, work instructions.
- Internal auditing: planning, checklists, interviewing, reporting.
- Corrective and preventive actions (CAPA).
- Continuous improvement: PDCA cycle, Kaizen.

Day 17: Advanced NDT and Emerging Technologies

- Advanced ultrasonic: phased array, guided waves, air-coupled.
- Digital radiography and computed tomography (CT).
- Laser shearography and digital image correlation (DIC).
- Automation: robotic inspection, inline monitoring.
- Industry 4.0: IoT, big data, machine learning in QC.

Day 18: Supplier Quality Management

- Supplier selection criteria: quality, delivery, cost.
- Supplier quality requirements: certifications, test reports.
- Receiving inspection and supplier scorecards.
- Supplier audits: scope, checklist, reporting.
- Non-conformance management with suppliers.

Day 19: Case Studies and Problem-Solving Workshops

- Case study 1: aerospace component – void reduction.
- Case study 2: automotive part – dimensional variation.
- Case study 3: marine structure – blistering and repair.
- Problem-solving methodology: 8D, DMAIC.
- Group presentation of solutions and discussion.

Day 20: Final Assessment and Course Review

- Written examination: theory and calculations.
- Practical assessment: inspection and reporting task.
- Course review: summary of all modules.
- Q&A; session and feedback.
- Issuance of certificates and 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 **24 NQF credits** at **NQF Level 4**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 64,000.00	R 64,000.00
1	In-House	R 83,200.00	R 83,200.00
1	On-Campus (Pretoria)	R 96,000.00	R 96,000.00

UPCOMING SESSIONS

Start	End	Method	Venue
04 Aug 2026	01 Sep 2026	On-Campus	Mauritius
05 Aug 2026	02 Sep 2026	On-Campus	Cape Town, South Africa
06 Aug 2026	03 Sep 2026	On-Campus	Dubai, UAE
07 Aug 2026	04 Sep 2026	On-Campus	Pretoria, South Africa
07 Aug 2026	04 Sep 2026	On-Campus	Lagos, Nigeria
10 Aug 2026	07 Sep 2026	On-Campus	Durban, South Africa
10 Aug 2026	07 Sep 2026	On-Campus	Mauritius
11 Aug 2026	08 Sep 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 110276) 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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