



Accredited Africa Training Institute for Capacity Development

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

Tel: +27 12 004 8389 · Mobile: +27 65 077 6310

Email: apply@aaticd.co.za · Website: www.aaticd.co.za

COURSE BROCHURE

Fabricating Specialised Polymer Composite Parts And Complex Assemblies Training

Manufacturing, Engineering and Technology / Manufacturing and Assembly

Unit Standard 110283 · NQF Level 4 · 28 Credits · 25 Days

COURSE OVERVIEW

This course equips learners with advanced skills to fabricate specialised polymer composite parts and complex assemblies. It covers material selection, layup techniques, curing processes, and quality assurance for high-performance composite components used in aerospace, automotive, and industrial applications.

Category	Manufacturing, Engineering and Technology
Subfield	Manufacturing and Assembly
Unit Standard	110283
Accreditation	SAQA Accredited · NQF Level 4 · 28 Credits
Duration	25 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Interpret engineering drawings and specifications for specialised polymer composite parts and complex assemblies.
- Select appropriate composite materials, including fibres, resins, and cores, based on performance requirements.
- Apply advanced layup techniques such as hand layup, vacuum bagging, and autoclave curing to fabricate components.
- Implement quality control procedures, including non-destructive testing, to verify part integrity and compliance.
- Demonstrate safe handling and storage of composite materials and adherence to health and safety regulations.
- Evaluate finished assemblies for dimensional accuracy, surface finish, and mechanical properties.

WHO SHOULD ATTEND

- This course is designed for technicians, engineers, and artisans involved in the manufacturing of polymer composite parts and assemblies, seeking to enhance their expertise in advanced fabrication techniques.

COURSE OUTLINE

Day 1: Introduction to Polymer Composites and Safety

- Overview of polymer composites: thermosets, thermoplastics, reinforcements
- Common applications in aerospace, automotive, marine
- Material safety data sheets (MSDS) and personal protective equipment (PPE)
- Workshop layout, ventilation, and fire safety
- Introduction to the unit standard and assessment criteria

Day 2: Composite Materials and Reinforcement Fibres

- Thermosetting resin chemistry and curing mechanisms
- Mechanical properties of fibres and resins
- Core materials (foam, honeycomb) and their uses
- Material storage and handling requirements
- Environmental considerations and waste management

Day 3: Mould Design and Preparation

- Mould materials: wood, metal, composites
- Mould design principles for part geometry
- Cleaning, sealing, and waxing moulds
- Use of PVA and semi-permanent release systems
- Storage and maintenance of moulds

Day 4: Hand Lay-Up Techniques

- Step-by-step hand lay-up procedure
- Resin mixing and pot life management
- Wetting out fibres and removing entrapped air
- Layering sequences for strength orientation
- Curing conditions and post-cure requirements

Day 5: Vacuum Bagging and Curing

- Vacuum bagging materials: bag film, sealant tape, breather, release film
- Bagging sequence and pleating techniques
- Vacuum pump operation and leak testing
- Cure cycles: room temperature vs. oven curing
- Post-cure inspection and de-bagging

Day 6: Resin Infusion (Resin Transfer Moulding)

- Principles of vacuum-assisted resin infusion (VARI)
- Distribution media, flow channels, and resin traps
- Calculating resin volume and flow rate
- Infusion procedure: degassing, opening valves, managing gel time
- Common infusion defects and troubleshooting

Day 7: Pre-preg Lamination and Autoclave Curing

- Pre-preg storage (freezer life) and thawing
- Cutting kits and ply orientation
- De-bulking steps between plies
- Autoclave cycle: vacuum, pressure, temperature ramps

- Quality checks: void content, degree of cure

Day 8: Filament Winding and Pultrusion

- Filament winding: helical, hoop, and polar patterns
- Tension control and fibre placement
- Mandrel design and removal
- Pultrusion: resin bath, preformer, heated die, puller
- Continuous profiles: rods, tubes, beams

Day 9: Compression Moulding and Sheet Moulding Compound (SMC)

- SMC composition and maturation
- Charge pattern design and coverage
- Press parameters: temperature, pressure, dwell time
- Flash and venting design
- Defects: porosity, sink marks, warpage

Day 10: Bonding and Joining of Composite Parts

- Surface preparation: abrasion, solvent wipe, peel ply
- Adhesive types: epoxy, acrylic, polyurethane
- Bond line thickness control and clamping
- Mechanical fastening: hole drilling, inserts, torque values
- Hybrid bonding techniques

Day 11: Trimming and Machining of Composites

- Tool selection: diamond-coated, carbide, PCD
- Cutting parameters: speed, feed, depth of cut
- Dust extraction and PPE (respiratory protection)
- Waterjet cutting: abrasive vs. pure
- Deburring and edge sealing

Day 12: Repair of Composite Structures

- Damage assessment: tap testing, ultrasonic, visual
- Repair materials: pre-preg patches, wet lay-up
- Scarf ratio and ply orientation matching
- Vacuum bagging repairs in situ
- Post-repair NDT and acceptance criteria

Day 13: Quality Control and Non-Destructive Testing (NDT)

- Quality standards (ISO, ASTM, customer specs)
- Visual inspection criteria
- Tap testing technique and interpretation
- Ultrasonic A-scan and C-scan basics
- Porosity and fibre volume fraction measurement

Day 14: Health, Safety, and Environmental Compliance

- Hazardous chemical regulations (SANS, OHSA)
- Ventilation and air monitoring
- Spill containment and disposal procedures
- Fire prevention with flammable resins
- Ergonomics and manual handling

Day 15: Advanced Complex Assemblies – Design for Manufacture

- Design for assembly (DFA) in composites
- Co-curing vs. secondary bonding
- Core splicing and edge close-outs
- Insert installation (potting, threaded inserts)
- Process sheets and work instructions

Day 16: Tooling for Complex Assemblies

- Tooling materials: invar, aluminium, carbon fibre
- Splash techniques from master models
- CTE (coefficient of thermal expansion) considerations
- Tooling compensation factors
- Tool maintenance and certification

Day 17: Manufacturing a Complex Assembly – Part 1

- Review assembly drawing and process plan
- Kitting materials and preparing moulds
- Lay-up sub-components with correct orientation
- Vacuum bagging and curing sub-components
- Intermediate quality checks

Day 18: Manufacturing a Complex Assembly – Part 2

- Surface preparation for bonding
- Adhesive application and jiggling
- Co-bonding vs. secondary bonding procedures
- Curing assembly in oven or press
- Post-cure inspection

Day 19: Final Assembly, Trimming, and Finishing

- Final machining and drilling operations
- Surface preparation for painting
- Gel coat repair and flow coating
- Painting and curing of topcoat
- Final inspection and sign-off

Day 20: Assessment, Review, and Certification

- Written examination on theory
- Practical demonstration of a complex assembly task
- Oral questioning on process choices
- Review of completed assembly against criteria
- Course wrap-up and certification

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 **28 NQF credits** at **NQF Level 4**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 74,200.00	R 74,200.00
1	In-House	R 96,500.00	R 96,500.00
1	On-Campus (Pretoria)	R 111,300.00	R 111,300.00

UPCOMING SESSIONS

Start	End	Method	Venue
31 Jul 2026	03 Sep 2026	On-Campus	Dar es Salaam, Tanzania
03 Aug 2026	04 Sep 2026	On-Campus	Johannesburg, South Africa
04 Aug 2026	07 Sep 2026	On-Campus	Mauritius
05 Aug 2026	08 Sep 2026	On-Campus	Cape Town, South Africa
06 Aug 2026	09 Sep 2026	On-Campus	Dubai, UAE
07 Aug 2026	10 Sep 2026	On-Campus	Pretoria, South Africa
07 Aug 2026	10 Sep 2026	On-Campus	Lagos, Nigeria
10 Aug 2026	11 Sep 2026	On-Campus	Mauritius

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 110283) 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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