



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

Manufacture Production Tooling from Drawings or Samples

Manufacturing, Engineering and Technology / Manufacturing and Assembly

Unit Standard 258723 · NQF Level 3 · 24 Credits · 21 Days

COURSE OVERVIEW

This course equips learners with the skills to manufacture production tooling from engineering drawings or sample parts, ensuring precision and adherence to specifications. It covers tool selection, machine setup, and quality control processes to produce tooling that meets industry standards.

Category	Manufacturing, Engineering and Technology
Subfield	Manufacturing and Assembly
Unit Standard	258723
Accreditation	SAQA Accredited · NQF Level 3 · 24 Credits
Duration	21 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Interpret engineering drawings and sample parts to determine tooling requirements.
- Select appropriate materials, tools, and machines for manufacturing production tooling.
- Set up and operate machine tools to produce tooling components to specified tolerances.
- Inspect finished tooling using measuring instruments to verify conformance to specifications.
- Apply safety procedures and maintain a clean working environment during tooling manufacture.

WHO SHOULD ATTEND

- This course is designed for machine operators, toolmakers, and production technicians who are responsible for manufacturing tooling components in a manufacturing environment.

COURSE OUTLINE

Day 1: Introduction to Manufacturing Tooling and Safety

- Overview of manufacturing tooling: jigs, fixtures, dies, moulds, gauges
- Role of tooling in production efficiency and quality
- Introduction to the South African National Standards (SANS) and OHS Act
- Safety precautions when handling materials and operating machinery
- PPE requirements and proper usage
- Housekeeping and hazard identification in the workshop

Day 2: Reading and Interpreting Engineering Drawings

- Types of engineering drawings: orthographic projection, isometric, exploded views
- Components of a drawing: title block, scale, revision table
- Dimensioning systems: linear, angular, and geometric tolerances
- Standard symbols: surface finish, welding, machining
- Material specifications and abbreviations
- Reading assembly drawings and part lists

Day 3: Understanding Tolerances and Fits

- Basic concepts: tolerance, allowance, clearance, interference
- ISO system of limits and fits: hole-basis and shaft-basis
- Tolerance grades (IT01 to IT18) and fundamental deviations
- Calculating maximum and minimum dimensions
- Selecting appropriate fits for tooling components
- Practical examples: press fits, sliding fits, running fits

Day 4: Materials Used in Tooling Manufacture

- Ferrous materials: carbon steel, alloy steel, tool steel, cast iron
- Non-ferrous materials: aluminium, brass, bronze, carbide
- Material properties: hardness, tensile strength, ductility
- Heat treatment: annealing, normalising, hardening, tempering
- Surface treatments: nitriding, carburising, plating
- Material selection criteria for jigs, fixtures, dies, and moulds

Day 5: Measurement and Inspection Tools

- Vernier callipers: reading and measurement techniques
- Micrometres: outside, inside, depth types
- Dial indicators and height gauges
- Gauge blocks and slip gauges
- Go/No-go gauges for thread and hole inspection
- Care, calibration, and storage of instruments
- Recording measurements and interpreting results

Day 6: Introduction to Machining Processes

- Overview of machining processes: turning, milling, drilling, grinding, shaping
- Machine tools: lathe, milling machine, drill press, surface grinder
- Cutting tool materials: high-speed steel, carbide, ceramics
- Cutting tool geometry: rake angle, clearance angle, cutting edge

- Workholding: chucks, collets, vises
- Machine safety: guards, emergency stops, chip handling

Day 7: Manual Machining: Turning and Facing

- Lathe components: headstock, tailstock, carriage, tool post
- Workholding: three-jaw chuck, four-jaw chuck, centres
- Cutting tool selection and mounting
- Turning parameters: cutting speed, feed rate, depth of cut
- Operations: straight turning, facing, chamfering, grooving
- Measuring finished diameters and lengths
- Troubleshooting common turning issues

Day 8: Manual Machining: Milling Operations

- Milling machine types: vertical, horizontal, universal
- Workholding: vise, clamps, indexing head
- Milling cutters: end mills, face mills, slot drills
- Cutting parameters: spindle speed, feed, depth of cut
- Operations: face milling, side milling, slotting, drilling
- Indexing: direct, simple, differential
- Inspection of flatness, squareness, and surface finish

Day 9: Drilling and Threading

- Twist drill geometry and nomenclature
- Drilling operations: centre drilling, through holes, blind holes
- Countersinking and counterboring tools
- Thread types: metric, unified, Whitworth
- Tapping: hand taps, machine tapping, tap selection
- Die threading for external threads
- Thread inspection: plug gauges, ring gauges, thread micrometers

Day 10: Grinding and Finishing Operations

- Grinding wheel marking system: abrasive, grit, grade, bond
- Surface grinding: set-up, wheel dressing, stock removal
- Cylindrical grinding: between centres, chucking
- Grinding parameters: wheel speed, work speed, depth of cut
- Surface finish measurement: Ra, Rz
- Deburring: manual and mechanical methods
- Polishing and lapping for fine finishes

Day 11: Introduction to CNC Machining

- CNC machine types: lathes, milling machines, machining centres
- Coordinate systems: machine zero, workpiece zero, absolute/incremental
- G-code basics: G00, G01, G02, G03, G90, G91
- M-code basics: M03, M05, M06, M08, M09, M30
- Tool offsets and tool length compensation
- Program simulation and verification
- Safety: interlock, emergency stop, program dry run

Day 12: Jig and Fixture Design Principles

- Functions of jigs and fixtures: accuracy, repeatability, interchangeability
- Locating principles: 3-2-1 rule, datum features
- Clamping principles: force direction, clamping mechanisms
- Types of jigs: template, plate, channel, box jigs
- Types of fixtures: milling, turning, grinding fixtures
- Standard components: drill bushes, toggle clamps, locating pins
- Design considerations: chip clearance, loading/unloading, rigidity

Day 13: Die Design and Construction

- Die types: blanking, piercing, progressive, compound, bending, drawing
- Die components: punch, die block, stripper plate, guide pins
- Clearance calculation: material thickness and shear strength
- Cutting force estimation
- Die materials and heat treatment
- Die set assembly: alignment, fastening, shimming
- Safety: handling sharp edges, spring-loaded strippers

Day 14: Mould Design and Construction

- Moulding processes: injection, compression, transfer, blow moulding
- Mould types: two-plate, three-plate, hot runner
- Mould components: cavity, core, sprue, runner, gate, ejector pins
- Draft angles and surface finish requirements
- Cooling system design: channels, baffles, bubblers
- Mould materials: tool steel, aluminium, beryllium copper
- Assembly: dowel pins, screws, alignment rings

Day 15: Tooling Assembly and Fitting

- Assembly procedures: sequence, cleanliness, lubrication
- Fitting techniques: filing, scraping, lapping
- Alignment: using dial indicators, squares, straight edges
- Shimming: materials, thickness selection
- Fastening: bolts, dowels, set screws, adhesives
- Inspection of assembled tooling: parallelism, perpendicularity
- Documentation: assembly records, non-conformance reports

Day 16: Testing and Tryout of Tooling

- Functional testing: moving parts, clearances, clamping forces
- Trial run: machine setup, material preparation, safety checks
- Inspection of trial parts: dimensional accuracy, surface finish
- Common defects: burrs, scratches, misalignment, flash
- Troubleshooting: adjusting clearances, modifying components
- Documentation: test reports, change requests, sign-off

Day 17: Quality Control and Inspection of Tooling

- Quality control plan: inspection points, sampling, acceptance criteria
- Inspection techniques: coordinate measuring machines (CMM), optical comparators
- Surface roughness measurement: profilometers
- Hardness testing: Rockwell, Brinell, Vickers

- Non-destructive testing: dye penetrant, magnetic particle
- Statistical process control basics: control charts
- Corrective actions: rework, scrap, design change

Day 18: Maintenance and Repair of Tooling

- Wear mechanisms: abrasive, adhesive, fatigue, corrosion
- Preventive maintenance: cleaning, lubrication, inspection schedule
- Repair techniques: welding (TIG, MIG), build-up, machining
- Replacement of worn components: bushes, pilots, inserts
- Sharpening and reconditioning of cutting edges
- Maintenance records: logbooks, checklists, spares inventory

Day 19: Advanced Tooling Applications and Problem Solving

- Root cause analysis: fishbone diagram, 5 Whys
- Lean principles: 5S, value stream mapping, waste reduction
- Design for manufacturability (DFM) in tooling
- Cost estimation: material, labour, overhead
- Case studies: reducing cycle time, improving tool life
- Emerging technologies: additive manufacturing, automation
- Problem-solving workshop: real-world scenarios

Day 20: Final Assessment and Course Review

- Review of all topics: safety, drawings, machining, assembly, quality
- Practical assessment: interpret drawing, plan operations, manufacture component, inspect
- Written test: theory, calculations, problem solving
- Feedback session: strengths, areas for improvement
- Certification requirements: portfolio of evidence, logbook
- Career pathways in tooling and die making

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 3**.

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
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
12 Aug 2026	09 Sep 2026	On-Campus	Dubai, UAE
13 Aug 2026	10 Sep 2026	On-Campus	Pretoria, South Africa
14 Aug 2026	11 Sep 2026	On-Campus	Abu Dhabi, UAE

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 258723) 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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