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

Process Control Loop Principles And Applications Training

Manufacturing, Engineering and Technology / Engineering and Related Design

Unit Standard 116084 · NQF Level 4 · 10 Credits · 7 Days

COURSE OVERVIEW

This course equips learners with the principles and applications of process control loops in industrial automation. Participants will gain the skills to analyze, configure, and troubleshoot control loop systems, ensuring efficient and safe process operations.

Category	Manufacturing, Engineering and Technology
Subfield	Engineering and Related Design
Unit Standard	116084
Accreditation	SAQA Accredited · NQF Level 4 · 10 Credits
Duration	7 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS — verifiable online

LEARNING OUTCOMES

- Apply the fundamental principles of process control loops to real-world industrial systems.
- Analyze the performance of control loops using metrics such as stability, response time, and offset.
- Evaluate the impact of tuning parameters (P, I, D) on loop behavior and system efficiency.
- Design a basic control loop configuration for a given process requirement.
- Implement troubleshooting procedures to diagnose and resolve common control loop issues.
- Demonstrate understanding of safety and reliability considerations in process control applications.

WHO SHOULD ATTEND

- This course is designed for process technicians, control engineers, and maintenance personnel involved in the operation and optimization of automated processes in industries such as manufacturing, petrochemicals, and utilities.

COURSE OUTLINE

Day 1: Introduction to Process Control and Loop Fundamentals

- Overview of process control in industry
- Key terminology: process variable, setpoint, manipulated variable, disturbance
- Components of a control loop
- Open-loop vs. closed-loop control
- Introduction to feedback control
- Practical examples of control loops in everyday life

Day 2: Sensors, Transmitters, and Signal Transmission

- Temperature sensors: thermocouples, RTDs, thermistors
- Pressure sensors: strain gauge, capacitive, piezoelectric
- Flow measurement: differential pressure, magnetic, ultrasonic
- Level measurement: radar, ultrasonic, displacer
- Transmitter types and signal conditioning
- 4-20 mA loop basics and HART communication
- Sensor selection criteria and calibration

Day 3: Controllers and Control Modes

- Controller architecture: setpoint, error, output
- On-off control and its limitations
- Proportional control: offset and gain
- Integral control: eliminating offset
- Derivative control: anticipating changes
- Combined PID control
- Controller tuning methods: trial-and-error, Ziegler-Nichols

Day 4: Final Control Elements and Actuators

- Control valve components: body, trim, actuator
- Valve flow characteristics and selection
- Pneumatic actuators and I/P transducers
- Electric actuators and smart positioners
- Variable frequency drives for pumps and fans
- Valve sizing basics
- Fail-safe positions and emergency shutdown

Day 5: Loop Tuning and Performance Optimization

- Performance criteria: stability, accuracy, robustness
- Open-loop tuning: process reaction curve method
- Closed-loop tuning: Ziegler-Nichols, Cohen-Coon
- Lambda tuning for self-regulating processes
- Identifying and correcting valve hysteresis and stiction
- Impact of dead time and process dynamics
- Practical tuning exercises with simulation

Day 6: Advanced Control Strategies and Applications

- Cascade control: primary and secondary loops

- Feedforward control: disturbance compensation
- Ratio control for blending and mixing
- Split-range control for multiple actuators
- Override and selector control
- Introduction to model predictive control (MPC
- Case studies: chemical reactor, distillation column, boiler control

Day 7: **Practical Integration, Troubleshooting, and Course Review**

- Step-by-step loop commissioning: from sensor to valve
- Troubleshooting methodology: check power, signal, calibration, tuning
- Common faults: wiring errors, drift, sticking valves
- Loop documentation: P&ID;, loop diagrams, tag numbers
- Safety practices: lockout/tagout, hazardous areas
- Practical hands-on exercises with training rigs
- Review of all days and mock assessment questions

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 **10 NQF credits** at **NQF Level 4**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 20,700.00	**R 20,700.00**
1	In-House	R 26,900.00	**R 26,900.00**
1	On-Campus (Pretoria)	R 31,000.00	**R 31,000.00**

UPCOMING SESSIONS

Start	End	Method	Venue
24 Sep 2026	02 Oct 2026	On-Campus	Victoria Falls, Zimbabwe
25 Sep 2026	05 Oct 2026	On-Campus	Nairobi, Kenya
25 Sep 2026	05 Oct 2026	On-Campus	Pretoria, South Africa
28 Sep 2026	06 Oct 2026	On-Campus	Mombasa, Kenya
28 Sep 2026	06 Oct 2026	On-Campus	Durban, South Africa
29 Sep 2026	07 Oct 2026	Online	—
30 Sep 2026	08 Oct 2026	On-Campus	Bangkok, Thailand
01 Oct 2026	09 Oct 2026	On-Campus	Dubai, 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 116084) 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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