



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

Automated Crude Oil Refining Process Equipment Operations Training

Manufacturing, Engineering and Technology / Manufacturing and Assembly

Unit Standard 110513 · NQF Level 3 · 20 Credits · 17 Days

COURSE OVERVIEW

This course equips learners with the skills and knowledge to operate automated crude oil refining process equipment safely and efficiently. It covers the principles of automated process control, equipment operation, and troubleshooting within a refinery environment, ensuring compliance with industry standards and safety regulations.

Category	Manufacturing, Engineering and Technology
Subfield	Manufacturing and Assembly
Unit Standard	110513
Accreditation	SAQA Accredited · NQF Level 3 · 20 Credits
Duration	17 days
Training Method	Online, On-Campus, In-House
Certificate	Issued via AATICD LMS – verifiable online

LEARNING OUTCOMES

- Demonstrate the ability to start up, operate, and shut down automated crude oil refining process equipment in accordance with standard operating procedures.
- Monitor and adjust process parameters using distributed control systems (DCS) to maintain optimal refining conditions.
- Apply troubleshooting techniques to identify and resolve common equipment malfunctions and process deviations.
- Evaluate process data to ensure product quality and compliance with safety and environmental standards.
- Implement emergency shutdown procedures and respond effectively to process alarms and abnormal situations.
- Analyze the interrelationship between unit operations in a crude oil refining process and optimize equipment performance.

COURSE OUTLINE

Day 1: Introduction to Crude Oil Refining and Process Equipment

- Overview of crude oil composition and properties
- Refining process flow: from crude to products
- Key equipment: distillation columns, heaters, pumps, compressors, heat exchangers
- Introduction to automation and control systems
- Safety protocols and PPE requirements
- Environmental regulations and emissions control

Day 2: Process Control Fundamentals and Instrumentation

- Control loop components: sensor, transmitter, controller, final control element
- Instrumentation types and selection criteria
- Piping and instrumentation diagrams (P&IDs;
- Distributed control systems (DCS) basics
- Programmable logic controllers (PLCs) overview
- Signal types (4-20 mA, HART, digital)

Day 3: Distillation Column Operations and Control

- Atmospheric and vacuum distillation
- Column internals: trays, packing, downcomers
- Reboilers and condensers
- Key parameters: reflux rate, feed preheat, column pressure
- Product draw-off and quality control
- Common operating issues: flooding, weeping, entrainment

Day 4: Heat Exchanger Operations and Control

- Heat exchanger configurations and applications
- Temperature control strategies: bypass, variable speed drives
- Fouling mechanisms and cleaning methods
- Monitoring: temperature, pressure drop, flow
- Troubleshooting: leakage, vibration, corrosion
- Energy recovery and pinch analysis basics

Day 5: Pump and Compressor Operations

- Centrifugal pumps: characteristics, head, NPSH
- Positive displacement pumps: reciprocating, rotary
- Centrifugal and reciprocating compressors
- Performance curves and surge control
- Seal systems and lubrication
- Start-up/shutdown sequences and vibration analysis

Day 6: Fired Heater and Boiler Operations

- Heater types: vertical cylindrical, cabin, box
- Combustion theory: stoichiometry, excess air
- Burner management systems (BMS)
- Draft control and stack monitoring
- Tube skin temperature monitoring

- Safety: flame scanners, purge cycles, interlocks

Day 7: Separation Processes: Gas Processing and Treating

- Amine treating: chemistry and process flow
- Glycol dehydration: TEG regeneration
- Gas processing: NGL recovery (cryogenic, absorption)
- Key parameters: amine concentration, circulation rate, reboiler temperature
- Foaming causes and mitigation
- Corrosion monitoring and inhibition

Day 8: Reactor Operations: Catalytic Cracking and Reforming

- Fluid catalytic cracking (FCC) process
- Catalytic reforming: continuous and semi-regenerative
- Catalyst types and regeneration
- Reactor temperature control and pressure drop
- Product yield optimization
- Regeneration: coke burn-off, temperature control

Day 9: Hydroprocessing: Hydrotreating and Hydrocracking

- Hydrotreating: desulfurization, denitrogenation
- Hydrocracking: conversion and selectivity
- Reactor internals and catalyst loading
- Temperature control: bed profiles, quench zones
- Hydrogen management: make-up, recycle, purity
- Catalyst sulfiding and regeneration

Day 10: Product Blending and Storage Operations

- Blending: in-line and batch blending
- Blend optimization: octane, cetane, volatility
- Storage tanks: fixed roof, floating roof, spheres
- Tank gauging and level measurement
- Inline analyzers: RVP, octane, sulfur
- Custody transfer: metering, sampling, calibration

Day 11: Utilities and Offsite Operations

- Steam generation and distribution
- Cooling water systems: towers, pumps, treatment
- Instrument air and nitrogen systems
- Flare system: knockout drums, seal drums, ignition
- Relief valves and rupture discs
- Utility optimization and energy management

Day 12: Advanced Process Control and Optimization

- Cascade control: master/slave loops
- Feedforward and ratio control
- Model predictive control (MPC) overview
- Real-time optimization (RTO)
- Alarm rationalization and management
- Operator decision support systems

Day 13: Safety Instrumented Systems and Emergency Shutdown

- Safety instrumented systems (SIS) standards (IEC 61511)
- Safety integrity level (SIL) determination
- ESD system architecture and cause-effect matrices
- Fire and gas detection systems
- Bypass and override procedures
- Proof testing and maintenance

Day 14: Process Troubleshooting and Root Cause Analysis

- Troubleshooting methodology: define, analyze, test, correct
- Trend analysis and data interpretation
- Common issues: fouling, corrosion, vibration, leakage
- Root cause analysis (RCA): 5 Whys, fishbone
- Case studies: distillation, heat exchanger, compressor failures
- Corrective and preventive actions

Day 15: Start-up, Shutdown, and Turnaround Operations

- Start-up sequences: purge, pressurize, heat-up, feed introduction
- Shutdown procedures: feed cut, depressurize, cool-down, isolation
- Turnaround planning: scope, resources, timeline
- Safe isolation: blinding, lockout/tagout
- Decontamination: steaming, nitrogen purging
- Post-turnaround start-up checks

Day 16: Maintenance Strategies and Reliability

- Preventive and predictive maintenance
- Condition monitoring: vibration, thermography, oil analysis
- Reliability-centered maintenance (RCM)
- Risk-based inspection (RBI) methodology
- Key performance indicators: MTBF, MTTR
- Spare parts management and criticality

Day 17: Integrated Operations, Simulation, and Assessment

- Integrated refinery simulation exercise
- Control room and field operator coordination
- Emergency scenario drills
- Review of key concepts and exam preparation
- Written assessment and practical evaluation
- Course feedback 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 **20 NQF credits** at **NQF Level 3**.

PRICING (PER DELEGATE, EX-VAT)

Delegates	Training Method	Price per Delegate	Total
1	Online	R 53,800.00	R 53,800.00
1	In-House	R 69,900.00	R 69,900.00
1	On-Campus (Pretoria)	R 80,700.00	R 80,700.00

UPCOMING SESSIONS

Start	End	Method	Venue
03 Aug 2026	25 Aug 2026	On-Campus	Johannesburg, South Africa
04 Aug 2026	26 Aug 2026	On-Campus	Mauritius
05 Aug 2026	27 Aug 2026	On-Campus	Cape Town, South Africa
06 Aug 2026	28 Aug 2026	On-Campus	Dubai, UAE
07 Aug 2026	31 Aug 2026	On-Campus	Pretoria, South Africa
07 Aug 2026	31 Aug 2026	On-Campus	Lagos, Nigeria
10 Aug 2026	01 Sep 2026	On-Campus	Durban, South Africa
10 Aug 2026	01 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 110513) 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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