

**AUTOMOTIVE TECHNICAL ACADEMY (ATA)**

**ATA-M100**

**Internal Combustion Engine Fundamentals & Service Technology**

**Curriculum Framework (Version 1.0)**

**Programme Status: Proposed for Locking**

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**Programme Information**

**Programme Code:**

ATA-M100

**Programme Title:**

Internal Combustion Engine Fundamentals & Service Technology

**Qualification Level:**

Professional Diploma

**Duration:**

48 Weeks

**Training Days:**

5 Days Per Week

**Hours Per Day:**

8 Hours

**Total Contact Hours:**

**1,920 Hours**

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**Teaching Philosophy**

- **70% Practical = 1,344 Hours**
  - **30% Theory = 576 Hours**
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**Entry Requirement**

Successful completion of:

**ATA-M000 – Automotive Mechanical Engineering Foundation**

or

Recognition of Prior Learning (RPL) in accordance with ATA admission policy.

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**Programme Goal**

## ATA-M100

To produce competent automotive engine technicians capable of inspecting, servicing, diagnosing, repairing, assembling, testing and maintaining modern petrol and diesel internal combustion engines using professional workshop practices, precision measuring instruments, OEM service procedures, and structured diagnostic methods.

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### Graduate Competency Profile

Graduates shall be able to:

- Explain four-stroke and two-stroke engine operating principles.
  - Identify and service petrol and diesel engine components.
  - Perform preventive maintenance.
  - Conduct engine mechanical inspections.
  - Measure engine wear using precision instruments.
  - Perform compression and leak-down testing.
  - Diagnose mechanical engine faults.
  - Remove and reinstall engines safely.
  - Service lubrication and cooling systems.
  - Service timing systems.
  - Inspect cylinder heads and valve trains.
  - Replace engine gaskets and oil seals.
  - Perform engine reassembly using correct torque procedures.
  - Verify repairs through structured testing.
  - Prepare professional service reports.
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### Programme Structure

| Module  | Title                                                      | Weeks | Hours |
|---------|------------------------------------------------------------|-------|-------|
| M100-01 | Engine Workshop Practice, Safety & Professional Procedures | 3     | 120   |
| M100-02 | Internal Combustion Engine Principles & Construction       | 5     | 200   |
| M100-03 | Engine Components, Lubrication & Cooling Systems           | 7     | 280   |

## ATA-M100

| Module       | Title                                                         | Weeks               | Hours                  |
|--------------|---------------------------------------------------------------|---------------------|------------------------|
| M100-04      | Valve Train, Timing Systems & Cylinder Head Service           | 6                   | 240                    |
| M100-05      | Engine Inspection, Precision Measurement & Mechanical Testing | 7                   | 280                    |
| M100-06      | Engine Removal, Installation & Mechanical Repairs             | 6                   | 240                    |
| M100-07      | Preventive Maintenance, Servicing & Quality Control           | 5                   | 200                    |
| M100-08      | Engine Diagnostics & Performance Verification                 | 5                   | 200                    |
| M100-09      | Integrated Engine Workshop Projects                           | 2                   | 80                     |
| M100-10      | Industrial Attachment, Capstone Project & Final Assessment    | 2                   | 80                     |
| <b>TOTAL</b> |                                                               | <b>48<br/>Weeks</b> | <b>1,920<br/>Hours</b> |

### Module 1

#### Engine Workshop Practice, Safety & Professional Procedures

**Duration:** 3 Weeks

Topics include:

- Engine workshop safety
- Safe engine lifting
- Engine stand operation
- PPE for engine work
- Workshop organization
- OEM workshop manuals
- Service documentation
- Torque procedures
- Professional ethics
- Environmental management

## **Module 2**

### **Internal Combustion Engine Principles & Construction**

Topics include:

- Four-stroke engines
  - Two-stroke engines
  - Petrol engines
  - Diesel engines
  - Engine classifications
  - Compression ratio
  - Combustion process
  - Engine layouts
  - Cylinder configurations
  - Engine operating cycles
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## **Module 3**

### **Engine Components, Lubrication & Cooling Systems**

Topics include:

- Cylinder block
  - Pistons
  - Connecting rods
  - Crankshaft
  - Bearings
  - Flywheel
  - Oil pumps
  - Oil galleries
  - Cooling systems
  - Water pumps
  - Thermostats
  - Radiators
  - Lubricants
  - Coolants
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## **Module 4**

## **Valve Train, Timing Systems & Cylinder Head Service**

Topics include:

- Camshafts
  - Timing belts
  - Timing chains
  - Valve mechanisms
  - Cylinder head inspection
  - Valve seat servicing
  - Valve clearance adjustment
  - Cam timing
  - Head gasket replacement
  - Torque sequence
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## **Module 5**

### **Engine Inspection, Precision Measurement & Mechanical Testing**

Topics include:

- Compression testing
  - Leak-down testing
  - Cylinder bore measurement
  - Crankshaft measurement
  - Piston inspection
  - Connecting rod inspection
  - Bearing clearance
  - Dial indicators
  - Micrometers
  - Vernier calipers
  - Service limit evaluation
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## **Module 6**

### **Engine Removal, Installation & Mechanical Repairs**

Topics include:

- Engine removal
- Engine installation
- Mount inspection

- Oil seal replacement
  - Gasket replacement
  - Component replacement
  - Torque application
  - Repair verification
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## **Module 7**

### **Preventive Maintenance, Servicing & Quality Control**

Topics include:

- Scheduled servicing
  - Oil service
  - Cooling system service
  - Lubrication inspection
  - Belt inspection
  - Fluid management
  - Workshop quality control
  - Customer documentation
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## **Module 8**

### **Engine Diagnostics & Performance Verification**

Topics include:

- Mechanical noise diagnosis
  - Vibration analysis
  - Overheating diagnosis
  - Low compression diagnosis
  - Oil pressure testing
  - Smoke diagnosis
  - Mechanical fault analysis
  - Final verification
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## **Module 9**

### **Integrated Engine Workshop Projects**

Students complete practical projects such as:

- Complete engine inspection

- Cooling system overhaul
  - Lubrication system servicing
  - Timing system replacement
  - Cylinder head servicing
  - Engine reassembly
  - Performance verification
  - Quality inspection
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## **Module 10**

### **Industrial Attachment, Capstone Project & Final Assessment**

Students complete:

- Supervised industrial attachment
  - Comprehensive engine service project
  - Practical trade test
  - Written examination
  - Capstone presentation
  - Portfolio assessment
  - Exit competency assessment
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### **Required Laboratories & Workshops**

- Engine Training Workshop
  - Engine Strip & Assembly Laboratory
  - Precision Measurement Laboratory
  - Cooling & Lubrication Systems Laboratory
  - Engine Testing & Diagnostics Bay
  - Industrial Skills Workshop
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### **Essential Equipment**

- Complete petrol engines
- Complete diesel engines
- Engine stands
- Engine cranes
- Compression testers
- Leak-down testers

## ATA-M100

- Oil pressure gauges
  - Cooling system pressure testers
  - Torque wrenches
  - Micrometers
  - Vernier calipers
  - Dial bore gauges
  - Dial indicators
  - Cylinder hone
  - Valve spring compressors
  - OEM service manuals
  - Professional workshop tool sets
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### Assessment Structure

| Assessment                                   | Weight      |
|----------------------------------------------|-------------|
| Continuous Practical Assessment              | 35%         |
| Practical Trade Tests                        | 30%         |
| Written Examination                          | 15%         |
| Capstone Project                             | 15%         |
| Professional Conduct & Industrial Attachment | 5%          |
| <b>TOTAL</b>                                 | <b>100%</b> |

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### Career Opportunities

Graduates may work as:

- Automotive Engine Technician
- Engine Service Technician
- Workshop Technician
- Fleet Maintenance Technician
- Engine Maintenance Supervisor
- Automotive Technical Instructor
- Service Advisor
- Independent Garage Owner
- Field Service Technician

## **ATA-M100**

- OEM Service Centre Technician