# MCE 514: Auto Workshop Practice

# LECTURE 1

## 1.0 DEFINITIONS

### Automotive Engineering

This is a part of Mechanical Engineering that deals with the design and operation of vehicles that move on land, sea and air.

### What is an automobile?

An automobile is a basically a four wheeled, self-powered motor vehicle which runs on road and it is used to transport passengers (the driver with an addition of passengers with numbers ranging from 1 to 7) and a little amount of load.

### Automobile Engineering

Automobile engineering is a branch of engineering which deals with everything about automobiles and practices to propel them.

### What is an automobile workshop?

An automobile workshop is a place where repairs and servicing of automobiles and automobile systems are done.

## 1.1 WORKSHOP SAFETY AND PREVENTIVE PROCEDURES IN THE AUTO-WORKSHOP

In an auto-workshop various services are rendered by the technical staff during repairs and servicing of automobile systems and parts. The technical staff and others in the workshop are expected to observe some laid down rules to be safe and to ensure the safety of others in the workshop.

The rules to obey are peculiar to the activities and services being rendered and are to be obeyed while working on automobiles in the workshop or outside the workshop. They are grouped as follows:-

(i) When working with vehicles in the workshop
(ii) When working with vehicles on the roadside
(iii) When working with lifting equipment
(iv) Storage and racking of parts
(v) Awkward postures
(vi) Handling heavy parts

### 1.1.1 When Working with Vehicles in the Workshop

**Hazards:** Moving vehicles may cause injuries to employees and members of the public. Therefore, appropriate measures must be taken to guard against this.

**Figure 1.1:** Low risk workshop: A neat and tidy workshop area

**Table 1.1:** When Working with Vehicles in the Workshop

| | **TASK / ACTIVITY** | **RULES/SAFETY MEASURES** |
|---|---|---|
| i | Management in workshop | ➢ Customers are to drop their vehicles at the car park/pickup area.<br>➢ Customers are not allowed to drive their vehicles within the workshop.<br>➢ Serviced/repaired vehicles are to be moved to the customer car park/pickup area by an employee. |
| ii | Work Areas | ➢ The vehicle route is marked out from the route of service personnel and pedestrian. |
| iii | Planning for pedestrian traffic | ➢ They should be designated customer parking bays<br>➢ A sign that reads “No unauthorized access” should be in place at all entry points of the workshop. |

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| iv | Vehicle Handling (Driving) | ➢ Employees are to drive vehicles within their licence and competency.<br>➢ Earth moving equipment and farm vehicles are to be moved to the designated repair areas from the vehicle drop off areas by licensed operators with appropriate experience. |
| v | Preventing vehicles from moving | Vehicles in the workshop are prevented from moving using atleast three methods:<br>➢ The vehicle keys are removed from the ignition.<br>➢ The hand brake is to be engaged.<br>➢ Vehicles are raised on a pillar hoist with all wheels off the ground.<br>➢ The vehicle's wheels are chocked on both sides of the vehicle's wheel with serviceable purpose-built chocks. |
| vi | Slip and trip prevention | ➢ All leads are stored out of the ways e.g. retractable reels.<br>➢ Power and pneumatic outlets are located close to the service area.<br>➢ Spill on the workshop floor are covered with absorbent material and immediately cleaned up.<br>➢ Potentially slippery surfaces are coated with non-slip coatings. |
| vii | Vehicle payload stability | ➢ Vehicle is unloaded or load is reduced to safe level before the start of brake servicing or tyre changing. |
| viii | Availability of the lifting equipment for the lifting and management of heavy objects | ➢ Manual handling aids are made available to technical staff while undertaking repair or servicing work. |
| ix | Communication with isolated worker/s | ➢ Constant communication with technical staffs working in isolated areas should be maintained by the supervisor.<br>➢ Emergency/panic alarm must be made available in such places. |

### 1.1.2 When Working with Vehicles on the Roadside:

**The hazards include:** high speed traffic, poor visibility and weather conditions, loose, soft or sloping ground conditions. Employees may be struck by a passing vehicle or crushed by the vehicle moving off jack. The rules and control measures below apply to all vehicles.

**Figure 1.2a:** Low risk workshop: Visible warning signs for approaching drivers

**Figure 1.2b:** Low risk workshop: Highly visible vest and warning lights

**Table 1.2:** When Working with Vehicles on the Roadside

| | **TASK / ACTIVITY** | **RULES/SAFETY MEASURES** |
|---|---|---|
| i | Traffic control at the site of the broken-down vehicle | ➢ Service personnel are to be competent in risk assessment and traffic control at the scene of a broken down vehicle. |

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| | | The control measure may include:<br>• Calling the police or other appropriate authorities e.g. Road safety officials.<br>• Arranging for the towing of the vehicle to a safe work area before the commencement of repair work.<br>• Putting in place prominent warning signs and lights for approaching drivers, some meters away from the broken-down vehicle.<br>• Traffic lane could be close to protect personnel and the broken-down vehicle.<br>• Traffic controller with appropriate equipment warns approaching drivers of the traffic danger ahead. |
| ii | Work area lighting and visibility | ➢ Worksite area and vehicle must be adequately lit using auxiliary lighting systems if required.<br>➢ High visibility vest appropriate to day or night must be worn by personnel at worksite.<br>➢ A combination of warning lights and signs must be prominently displayed to warn motorists of the activities going on at the site. |
| iii | All other rules that are applicable in the workshop apply here too. | |

### 1.1.3 When Working with Lifting Equipment:

**Hazards:** Failure of lifting equipment causing crushing injuries and/or fatalities. Control measures to ensure safety are to be taken.


**Figure 1.3a:** Low risk workshop activity: Operating instruction prominently in display.

**Figure 1.3b:** Low risk workshop activity: Trolley jack and axle stands must be used at all times.

**Table 1.3:** When Working with Lifting Equipment

| | **TASK / ACTIVITY** | **RULES/SAFETY MEASURES** |
|---|---|---|
| i | Vehicle hoists | ➢ Hoist inspections are to be undertaken to the manufacturer's standard.<br>➢ Pre-operation inspections are to be done daily.<br>➢ Routine inspection and maintenance are to be done at least every three (3) months.<br>➢ Comprehensive annual inspections are to be conducted. |

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| | | ➢ Results of all inspections, servicing and maintenance are to be recorded in a log book and made available to users and maintenance or inspection personnel.<br>➢ All servicing and maintenance are to be carried out by qualified and competent persons.<br>➢ Operating and maintenance instruction plates are to be prominently displayed on hoists.<br>➢ Safe working loads are to be prominently displayed on equipment.<br>➢ The moving parts of the hoist or its loads should have a minimum clearance of 600 mm to any fixed structure or other equipment that moves.<br>➢ Electrical hoists and wiring are to be tested according to AS/NZS 3000 Australian wiring rules.<br>➢ The hoist controls are meant to be in good conditions, properly positioned and clearly marked for safe operation.<br>➢ Dropper bar should be fitted to in-ground hydraulic ram type hoist to prevent hoist lowering to less than 760 mm.<br>➢ All hoist-safety devices must be operational.<br>➢ All hoist operators must be properly trained in the correct use and inspection of the vehicle hoist. |
| ii | Hydraulic jacks and trolley jacks use. | Same as vehicle hoist inspection. |
| iii | Vehicle ramps and stands | ➢ Vehicle ramps and stands are to be marked with rated capacities.<br>➢ Inspections of the vehicle ramp and stands are to be undertaken.<br>➢ Pre-operation inspections are to be done daily.<br>➢ Routine inspection and maintenance are to be done at least once every 3 months.<br>➢ Annual inspections are to be conducted.<br>➢ The results of all inspections, servicing and maintenance are to be recorded in a log book and |

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| | | made available to people using the equipment.<br>➢ Vehicles on ramps are to be secured in such a way to prevent movement. |
| iv | Tag out/lock out system | ➢ All hoists, trolley jack, stands and ramps that are found to be unsafe are immediately removed from service.<br>➢ Tag out/lock out system are to be put in place to ensure faulty equipment are not used until they are made safe. |