

## **Accident Repair - MET** **(Syllabus Content)**

### **Assessment Requirements**

#### **Unit G01/02K – Knowledge of Health, Safety and Good Housekeeping in the Automotive Environment**

##### **Content:**

##### **Economic use of Resources**

- a. consumable materials e.g. grease, oils, split pins, locking and fastening devices etc.

##### **Requirement to maintain work area effectively**

- a. cleaning tools and equipment to maximise workplace efficiency.
- b. requirement to carry out the housekeeping activities safely and in a way that minimises inconvenience to customers and staff.
- c. risks involved when using solvents and detergents.
- d. advantages of good housekeeping.

##### **Spillages, leaks and waste materials**

- a. relevance of safe systems of work to the storage and disposal of waste materials.
- b. requirement to store and dispose of waste, used materials and debris correctly.
- c. safe disposal of special / hazardous waste materials.
- d. advantages of recycling waste materials.
- e. dealing with spillages and leaks

##### **Basic legislative requirements**

- a. Provision and Use of Work Equipment Regulations 1992.
- b. Power Presses Regulations 1992.
- c. Pressure Systems and Transportable Gas Containers Regulations 1989.
- d. Electricity at Work Regulations 1989.
- e. Noise at Work Regulations 1989.
- f. Manual Handling Operations Regulations 1992.
- g. Health and Safety (Display Screen Equipment) Regulations 1992.
- h. Abrasive Wheel Regulations.
- i. Safe Working Loads.
- j. Working at Height Regulations (date)

##### **Routine maintenance of the workplace**

- a. Trainees personal responsibilities and limits of their authority with regard to work equipment.
- b. Risk assessment of the workplace activities and work equipment.
- c. Workplace person responsible for training and maintenance of workplace equipment.
- d. When and why safety equipment must be used.
- e. Location of safety equipment.
- f. Particular hazards associated with their work area and equipment.
- g. Prohibited areas.
- h. Plant and machinery that trainees must **not** use or operate.
- i. Why and how faults on unsafe equipment should be reported.
- j. Storing tools, equipment and products safely and appropriately.
- k. Using the correct PPE.
- l. Following manufacturers' recommendations.

- m. Location of routine maintenance information e.g. electrical safety check log.

**Legislation relevant to Health and Safety**

- i. HASAWA
- ii. COSHH
- iii. EPA
- iv. Manual Handling Operations Regulations 1992
- v. PPE Regulations 1992

**General regulations to include an awareness of:**

- i. Health and Safety (Display Screen Equipment) Regulations 1992
- ii. Health and Safety (First Aid) Regulations 1981
- iii. Health and Safety (Safety Signs and Signals) Regulations 1996
- iv. Health and Safety (Consultation with Employees) Regulations 1996
- v. Employers Liability (Compulsory Insurance) Act 1969 and Regulations 1998
- vi. Confined Spaces Regulations 1997
- vii. Noise at Work Regulations 1989
- viii. Electricity at Work Regulations 1989
- ix. Electricity (Safety) Regulations 1994
- x. Fire Precautions Act 1971
- xi. Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1985
- xii. Pressure Systems Safety Regulations 2000
- xiii. Waste Management 1991
- xiv. Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) 2002
- xv. Control of Asbestos at Work Regulations 2002

**Legislative duties**

- a. The purpose of a Health and Safety Policy.
- b. The relevance of the Health and Safety Executive.
- c. The relevance of an initial induction to Health and Safety requirements at your workplace.
- d. General employee responsibilities under the HASAWA and the consequences of non-compliance.
- e. General employer responsibilities under the HASAWA and the consequences of non-compliance.
- f. The limits of authority with regard to Health and Safety within a personal job role.
- g. Workplace procedure to be followed to report Health and Safety matters.

**Precautions to be taken when working with vehicles, workshop materials, tools and equipment including electrical safety, pneumatics and hydraulics**

- a. Accessing and interpreting safety information
- b. Seeking advice when needed
- c. Seeking assistance when required
- d. Reporting of unsafe equipment
- e. Storing tools, equipment and products safely and appropriately
- f. Using the correct PPE
- g. Following manufacturers recommendations
- h. Following application procedures e.g. hazardous substances
- i. The correct selection and use of extraction equipment

**PPE to include:**

- a. Typical maintenance procedures for PPE equipment to include:
  - i. typical maintenance log
  - ii. cleaning procedures
  - iii. filter maintenance
  - iv. variation in glove types

- v. air quality checks
- b. Choice and fitting procedures for masks and air breathing equipment.
- c. Typical workplace processes which would require the use of PPE to include:
  - i. welding
  - ii. sanding and grinding
  - iii. filling
  - iv. panel removal and replacement
  - v. drilling
  - vi. cutting
  - vii. chiselling
  - viii. removal of broken glass
  - ix. removal of rubber seals from fire damaged vehicles
  - x. removal of hypodermic needles
  - xi. servicing activities
  - xii. roadside recovery
- d. Unserviceable PPE.
- e. PPE required for a range automotive repair activities. To include appropriate protection of:
  - i. eyes
  - ii. ears
  - iii. head
  - iv. skin
  - v. feet
  - vi. hands
  - vii. lungs

### **Fire and extinguishers**

- a. Classification of fire types
- b. Using a fire extinguisher effectively. Types of Extinguishers:
  - i. Foam
  - ii. dry powder
  - iii. CO2
  - iv. Water
  - v. fire blanket

### **Action to be taken in the event of a fire to include:**

- a. The procedure as:
  - i. raise the alarm
  - ii. fight fire only if appropriate
  - iii. evacuate building
  - iv. call for assistance

### **Product warning labels to include:**

- a. Reasons for placing warning labels on containers.
- b. Warning labels in common use, to include:
  - i. toxic
  - ii. corrosive
  - iii. poisonous
  - iv. harmful
  - v. irritant
  - vi. flammable
  - vii. explosive

### **Warning signs and notices**

- a. Colours used for warning signs:
  - i. red

- ii. blue
- iii. green
- b. Shapes and meaning of warning signs:
  - i. round
  - ii. triangular
  - iii. square
- c. The meaning of prohibitive warning signs in common use.
- d. The meaning of mandatory warning signs in common use.
- e. The meaning of warning notices in common use.
- f. General design of safe place warning signs.

**Hazards and risks to include:**

- a. The difference between a risk and a hazard.
- b. Potential risks resulting from:
  - i. the use and maintenance of machinery or equipment
  - ii. the use of materials or substances
  - iii. accidental breakages and spillages
  - iv. unsafe behaviour
  - v. working practices that do not conform to laid down policies
  - vi. environmental factors
  - vii. personal presentation
  - viii. unauthorised personal, customers, contractors etc entering your work premises
  - ix. working by the roadside
  - x. vehicle recovery
- c. The employee's responsibilities in identifying and reporting risks within their working environment.
- d. The method of reporting risks that are outside your limits of authority.
- e. Potential causes of:
  - i. fire
  - ii. explosion
  - iii. noise
  - iv. harmful fumes
  - v. slips
  - vi. trips
  - vii falling objects
  - viii accidents whilst dealing with broken down vehicles

**Personal responsibilities**

- a. The purpose of workplace policies and procedures on:
  - i. the use of safe working methods and equipment
  - ii. the safe use of hazardous substances
  - iii. smoking, eating , drinking and drugs
  - iv. emergency procedures
  - v. personal appearance
- b. The importance of personal appearance in the control of health and safety.

**Action to be taken in the event of colleagues suffering accidents**

- a. The typical sequence of events following the discovery of an accident such as:
  - i. make the area safe
  - ii. remove hazards if appropriate i.e. switch off power
  - iii. administer minor first aid
  - iv. take appropriate action to re-assure the injured party
  - v. raise the alarm
  - vi. get help

- vii. report on the accident
- b. Typical examples of first aid which can be administered by persons at the scene of an accident:
- i. check for consciousness
  - ii. stem bleeding
  - iii. keep the injured person's airways free
  - iv. place in the recovery position if injured person is unconscious
  - v. issue plasters for minor cuts
  - vi. action to prevent shock i.e. keep the injured party warm
  - vii. administer water for minor burns or chemical injuries
  - viii. wash eyes with water to remove dust or ingress of chemicals (battery acid)
  - ix. need to seek professional help for serious injuries
- c. Examples of bad practice which may result in further injury such as:
- i. moving the injured party
  - ii. removing foreign objects from wounds or eyes
  - iii. inducing vomiting
  - iv. straightening deformed limbs

## Assessment Requirements

### Unit G3K – Knowledge of Support for Job Roles in the Automotive Environment

#### Content:

#### The structure of a typical vehicle repair business

##### a. How these areas relate to each other within the business

- i. body shop
- ii. vehicle repair workshop
- iii. paint shop
- iv. valeting
- v. vehicle parts store
- vi. main office
- vii. vehicle sales
- viii. reception

##### b. Sources of information

- i. other staff
- ii. manuals
- iii. parts lists
- iv. computer software and the internet
- v. manufacturer
- vi. diagnostic equipment

#### Communication requirements when carrying out vehicle repairs

##### a. Locating and using correct documentation and information for:

- i. recording vehicle maintenance and repairs
- ii. vehicle specifications
- iii. component specifications
- iv. oil and fluid specifications
- v. equipment and tools
- vi. identification codes

##### b. Procedures for:

- i. referral of problems
- ii. reporting delays
- iii. additional work identified during repair or maintenance
- iv. keeping others informed of progress

#### Methods of Communication

- a. verbal
- b. signs and notices

- c. memos
  - d. telephone
  - e. electronic mail
  - f. vehicle job card
  - g. notice boards
  - h. SMS text messaging
  - i. Letters
- a. Organisational & Customer requirements:
- i. importance of time scales to customer and organization
  - ii. relationship between time and costs
  - iii. meaning of profit
- b. Choice of Communication
- i. distance
  - ii. location
  - iii. job responsibility
- b. Importance of maintaining positive working relationships:
- a. morale
  - b. productivity
  - c. company image
  - d. customer relationships
  - e. colleagues

## Assessment Requirements

### Unit G4K – Knowledge of Materials, Fabrication, Tools and Measuring Devices used in the Automotive Environment

#### Content:

**Common types of hand tools used for fabricating and fitting in the automotive workplace.**

**To include:**

- a. files
- b. hacksaws and snips
- c. hammers
- d. screwdrivers
- e. pliers
- f. spanners
- g. sockets
- h. punches
- i. types of drill and drill bits
- j. taps and dies
- k. stud removers
- l. marking out tools

**Common measuring devices used for fabrication and fitting in the automotive workplace.**

**To include:**

- a. rule/tape
- b. callipers
- c. feeler gauge
- d. volume measures
- e. micrometer
- f. dial gauges
- g. torque wrenches
- h. depth gauges

**Common electrical measuring tools used in the repair of vehicles and components. To include:**

- a. ammeter
- b. voltmeter
- c. ohmmeter
- d. multi-meter

**Common electrical terms when measuring:**

- a. voltage
- b. current
- c. resistance

**Workshop equipment (including appropriate PPE). To include:**

- a. hydraulic jacks
- b. axle stands
- c. pillar drills
- d. air tools
- e. vehicle lifts
- f. cranes



- g. hoists
- h. electrical power tools

**Properties, application and limitations (to include safe use) of ferrous and non-ferrous metals used when constructing, modifying and repairing vehicles and components.**

**Materials to include:**

- a. carbon steels
- b. alloy steels
- c. cast iron
- d. aluminium alloys
- e. brass
- f. copper
- g. lead

**Properties, application and limitations (to include safe use) of non-metallic materials used when constructing, modifying and repairing vehicles and components. Materials to include:**

- a. glass
- b. plastics (inc. GRP)
- c. Kevlar
- d. rubber

**Terms relating to the properties of materials. To include:**

- a. hardness
- b. toughness
- c. ductility
- d. elasticity
- e. tenacity
- f. malleability
- g. plasticity

## Assessment Requirements

### Unit MET01K – Knowledge of Removing and Fitting Vehicle Mechanical Components

#### Content:

The identification and operation of:

- a. Engine Cooling Systems
- b. Exhaust
- c. Fuel
- d. Supplementary Restraint Systems
- e. Suspension - with no Electronic Control
- f. In vehicle entertainment – Audio only
- g. Electro-Mechanical Locking
- h. Air Conditioning – Evacuation, Re-gas and Oil of System, RRR of Dryer, Condenser & Pipe Work, Legislation around Refrigerant Handling
- i. Engines components
- j. Drivelines and Hubs
- k. Final Drive Assemblies
- l. Steering components
- m. Braking components
- n. Tow Bars

#### **The specific manufacturers and workshop procedures for the removal, renewal and replacement of components and systems.**

- a. The procedure and methods used to remove and fit exhaust systems addressing the following:
  - i. oxygen / gas sensors (explain why hammers or pneumatic tools should not be used)
  - ii. catalytic converters (explain why hammers or pneumatic tools should not be used)
  - iii. mounting systems
  - iv. seals and gaskets
  - v. alignment
- b. The procedure for the removal and fitting of brake system components:
  - i. fluid
  - ii. callipers
  - iii. discs
  - iv. drums
  - v. cables
  - vi. pipes and hoses
- c. Suspension systems and specific procedures relating to:
  - i. coil spring (McPherson strut)
  - ii. air
  - iii. hydrolastic
  - iv. leaf spring
  - v. torsion bar
- d. The procedure for the removal and fitting of interior items:
  - i. seats (including pre-tensioner)
  - ii. In Car Entertainment (I.C.E). systems – audio only
  - iii. Supplementary Restraint System (S.R.S). systems deployed and un-deployed
- e. The procedure for the removal and fitting of security devices:
  - i. mechanical locks
  - ii. electro-mechanical locks

- iii. electronic 'drop glass' systems (note: glass will not be easily movable when door is removed)
- iv. mechanical 'drop glass' systems
- f. The procedure for the removal and fitting of cooling system components
  - i. radiator and cowlings
  - ii. cooling fans
  - iii. drive belts
  - iv. pipes, hoses and sensors
  - v. air locks and bleeding techniques
- g. The system components for power and non power steering and the removal / renewal and fitting of them.
- h. The procedure for the removal of fuel tanks.
- i. The procedure for the removal and fitting of transmission systems
  - i. operating mechanisms; pedal and lever, mechanical systems, cable
  - ii. clutch components; pressure plate, centre plate, release bearing
  - iii. hydraulic system; master cylinder, slave cylinder, hydraulic pipes
  - iv. gearboxes
  - v. propshafts
  - vi. drive shafts
  - vii. universal joints
  - viii. sliding couplings
  - ix. constant velocity joints
- j. The reasons for using flexible couplings and sliding joints in transmissions systems.
- k. The reason for using constant velocity joints in drive shafts incorporating steering mechanisms.
- l. The importance of using approved parts, components and procedures:
  - i. operation
  - ii. warranty

#### **Techniques and tools to carry out operational checks**

- a. Equipment and process of checking and steering geometry:
  - i. skid plates
  - ii. two wheel alignment tracking gauges
  - iii. four wheel alignment tracking gauges
  - iv. castor
  - v. camber
  - vi. K.P.I.
  - vii. toe-in / out
- b. The tools and processes for checking fluid levels / pressures:
  - i. cooling system (pressure, level, thermostat operation, cooling fan operation and antifreeze protection level)
  - ii. steering, engine, transmission and braking systems
  - iii. tyre pressures
  - iv. tyre types and sizes relating to the mixing of tyres of different construction type

#### **Procedures to prevent damage to the vehicle, components and contents when removing, storing and refitting components**

- a. The methods that can be used to protect undamaged items to ensure they are removed and refitted without causing unnecessary damage:
- b. The procedures for the correct storage of vehicle contents.
- c. The process for the reporting of extra damage and items that may have broken when removed or refitted.

### **Types of clips and fixings**

- a. The following types of clips and identify reasons and limitations for their use:
  - i. speed
  - ii. 'c'
  - iii. 'd'
  - iv. 'j' type captive nut
  - v. 'r'
  - vi. 'u' type captive nut
  - vii. cable clip
  - viii. trim clips
- b. The following types of fixings and identify reasons and limitations for their use:
  - i. pop rivet
  - ii. plastic rivet
  - iii. plastic capture nut
  - iv. nut and bolt
  - v. shoulder bolt
  - vi. 'Nyloc' type nuts
  - vii. washers
  - viii. 'Spring' type washers
  - ix. self tapping screws and bolts
  - x. quick release plastic trim fastenings
  - xi. trim tapes
  - xii. adhesives and sealers

### **The processes involved when carrying out quality checks**

- a. Items that may have been 'workshop' soiled and describe processes for rectifying:
  - i. door cards
  - ii. seats
  - iii. carpets
  - iv. boot and bonnet trims
- b. Methods for checking gaps.
  - i. The process for checking and aligning components

### **Mechanical Components**

- a. Road Wheels
- b. Engine Cooling Systems
- c. Exhaust
- d. Fuel
- e. Supplementary Restraint Systems
- f. Suspension with no Electronic Control
- g. In vehicle entertainment – Audio only
- h. Central locking systems
- i. Air Conditioning – Evacuation, Re-gas and Oil of System, RRR of Dryer, Condenser & Pipe Work, Legislation around Refrigerant Handling
- j. External Engine components
- k. Drivelines and Hubs
- l. Final Drive Assemblies
- m. Steering components
- n. Braking components
- o. Tow Bars

## Assessment Requirements

### Unit MET02K – Knowledge of Removing and Fitting Electrical Components

#### Content:

#### Basic electrical and electronic principles and electrical circuits

- a. Quantities:
  - i. basic volt (electrical pressure)
  - ii. ampere (electrical current)
  - iii. ohm (electrical resistance)
  - iv. watt (power)
- b. The requirements of an electrical circuit:
  - i. battery
  - ii. cables
  - iii. switch
  - iv. current consuming device
- c. The direction of current flow and electron flow.
- d. Simple series and parallel circuits.
- e. Earth and insulated return.
- f. Cable sizes and colour codes.
- g. Types of connectors, terminals and circuit protection devices.
- h. Common electrical and electronic symbols.
- i. The meaning of:
  - i. short circuit
  - ii. open circuit
  - iii. bad earth
  - iv. high resistance
  - v. electrical capacity
- j. The basic principle of vehicle electronics and solid state.
- k. procedures involved in carrying out the systematic removal and fitting of electrical components
  - i. batteries
  - ii. headlamps
  - iii. wiper systems
  - iv. electric window systems
- l. electrical system components
  - i. batteries
  - ii. headlamps
  - iii. wiper systems
  - iv. electric window systems

#### Vehicle electrical wiring diagrams

- a. Interpret circuits to include:
  - i. vehicle lighting
  - ii. auxiliary circuits
  - iii. indicators

### **Vehicle batteries**

- a. The construction and principles of vehicle batteries.

### **Vehicle lighting and auxiliary systems**

- a. Identify the function and operating principles of:
  - i. types of switches
  - ii. circuit protection devices
  - iii. relays
  - iv. types of bulb
  - v. front and tail lamps
  - vi. main and dip beam headlamps
  - vii. lighting and dip switch
  - viii. window winding
  - ix. heating and ventilation systems, fan and heater
  - x. door mirror mechanisms
  - xi. interior lights and switching
  - xii. directional indicators
- b. The statutory lighting requirements when using a vehicle on the road.
- c. The need for headlamp adjustment.

### **Requirements of electrical and electronic systems**

- a. The requirements for checking security and cleanliness of components, connections, correct operation of components and instruments, battery electrolyte, headlamp alignment, drive belt wear and tension.
- b. The basic procedures for checking the operation of electrical circuits:
  - i. use of multi-meters, volt, amps, ohms
  - ii. checking voltage supply
  - iii. checking current flow and consumption
  - iv. checking resistance and volt drop
  - v. checking lamp operation, dip and main beam
  - vi. checking indicators
- c. Safety precautions when working on electrical and electronic circuits to include:
  - i. disconnection and connection of battery
  - ii. avoidance of short circuits
  - iii. circuit protection

### **Procedures to prevent damage to the vehicle, components and contents when removing, storing and refitting components**

- a. The methods that can be used to protect undamaged items to ensure they are removed and refitted without causing unnecessary damage:
- b. The procedures for the correct storage of vehicle contents.
- c. The process for the reporting of extra damage and items that may have broken when removed or refitted.

### **Types of clips and fixings**

- a. The following types of clips and identify reasons and limitations for their use:
  - i. speed
  - ii. 'c'
  - iii. 'd'
  - iv. 'j' type captive nut
  - v. 'r'
  - vi. 'u' type captive nut
  - vii. cable clip

- viii. trim clips
- b. The following types of fixings and identify reasons and limitations for their use:
  - i. pop rivet
  - ii. plastic rivet
  - iii. plastic capture nut
  - iv. nut and bolt
  - v. shoulder bolt
  - vi. 'Nyloc' type nuts
  - vii. washers
  - viii. 'Spring' type washers
  - ix. self tapping screws and bolts
  - x. quick release plastic trim fastenings
  - xi. trim tapes
  - xii. adhesives and sealers

**The processes involved when carrying out quality checks**

- a. Items that may have been 'workshop' soiled and describe processes for rectifying:
  - i. door cards
  - ii. seats
  - iii. carpets
  - iv. boot and bonnet trims
- b. Methods for checking gaps.
- c. The process for checking and aligning headlamps:
  - i. address handling procedures for halogen bulbs
  - ii. address handling and health and safety issues relating to xenon bulbs and systems
- d. Operational checks and rectification methods to include:
  - i. lights
  - ii. washers and wipers
  - iii. Supplementary Restraint Structure (SRS) systems (checking not rectification)
  - iv. charging system (checking not rectification)
  - v. horn
  - vi. fluid levels
  - vii. interior switches
  - viii. operation of door lock mechanisms

**Electrical Components**

- a. Batteries
- b. Headlamps
- c. Wiper systems
- d. Electric Window Systems

## Assessment Requirements

### Unit MET03K – Knowledge of Removing and Fitting Trim Components

#### Content:

#### Procedures to prevent damage to the vehicle, components and contents when removing, storing and refitting components

a. The methods that can be used to protect undamaged items to ensure they are removed and refitted without causing unnecessary damage:

- i. trims
- ii. mouldings
- iii. bumpers
- iv. door cards
- v. headlamps
- vi. window and waist mouldings
- vii. bonnet and boot lid trim
- viii. sunroof systems
- ix. carpets
- x. headlining
- xi. spoilers

b. The procedures for the correct storage of vehicle contents.

c. The process for the reporting of extra damage and items that may have broken when removed or refitted.

#### Tools and equipment

a. the use of the following:

- i. trolley jack
- ii. axle stands
- iii. two post ramp
- iv. four post ramp with 'wheel free'
- v. torque wrenches
- vi. trim tools
- vii. general hand tool selection
- viii. manufacturers specialist tools
- ix. air drills and bits
- x. impact drivers
- xi. rivet guns

#### The processes involved when handling batteries

a. The procedure for the removal, storage and refitting of batteries.

b. The procedure for the disposal of batteries.

c. Battery checks as appropriate:

- i. electrolyte
- ii. discharge
- iii. specific gravity

d. The charging process and procedures:

- i. trickle charge



- ii. normal charge
- iii. boost / start
- e. The health and safety issues involved when charging (explosive gasses).

### Types of clips and fixings

- a. The following types of clips and identify reasons and limitations for their use:

- i. speed
- ii. 'c'
- iii. 'd'
- iv. 'j' type captive nut
- v. 'r'
- vi. 'u' type captive nut
- vii. cable clip
- viii. trim clips

- b. The following types of fixings and identify reasons and limitations for their use:

- i. pop rivet
- ii. plastic rivet
- iii. plastic capture nut
- iv. nut and bolt
- v. shoulder bolt
- vi. 'Nyloc' type nuts
- vii. washers
- viii. 'Spring' type washers
- ix. self tapping screws and bolts
- x. quick release plastic trim fastenings
- xi. trim tapes/adhesives and sealers

### The processes involved when carrying out quality checks

- a. Items that may have been 'workshop' soiled and describe processes for rectifying:

- i. door cards
- ii. seats
- iii. carpets
- iv. boot and bonnet trims
- v. headlamps
- vi. window and waist mouldings
- vii. bonnet and boot lid trim
- viii. sunroof systems
- ix. carpets
- x. headlining
- xi. spoilers

Methods for checking gaps.

### Principle Trim Components

- a. Bumpers
- b. Door Trim
- c. Window and Waist Mouldings
- d. Bonnet and Boot lid Trim
- e. Sunroof Systems
- f. Carpets



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- g. Headlining
- h. Spoilers

## Assessment Requirements

### Unit MET04K – Knowledge of Removing and Fitting Electronically Controlled Vehicle Mechanical Components

#### Content:

#### The construction and operating principals of electronically controlled suspension systems and assemblies

##### Suspension

- a. The components and layout of electronically controlled suspension systems
- b. The operation of electronically suspension systems and components:
- c. The advantages of different systems including:
  - i. non-independent
  - ii. independent suspension (IFS)
  - iii. independent suspension (IRS)
  - iv. hydraulic
  - v. hydro-pneumatic
  - vi. rigid axle
- d. The principles of electronic suspensions systems.
- e. The forces acting on suspension systems during braking, driving and cornering.
- f. The methods of locating the road wheels against braking, driving and cornering forces.
- g. The methods of controlling cornering forces by fitting anti-roll torsion members
- h. Suspension terms:
  - i. rebound
  - ii. bump
  - iii. float
  - iv. dive
  - v. pitch
  - vi. roll
  - vii. compliance
- i. The procedures used for inspecting the serviceability and condition of the suspension system

##### Components and operation of self-levelling suspension

- a. The components, construction and operation of a self leveling suspension system.
- b. The operation of self -leveling suspension system under various conditions:
  - i. self-energizing
  - ii. pump operated self-levelling suspension

##### Operation of fitting ride-controlled systems.

- a. The reasons for fitting ride controlled systems.
- b. The operation of driver controlled and ride controlled systems.

#### The construction and operating principals of climate control systems and assemblies

##### The function of component heater, cooling parts and climate control

- a. Components include:
  - i. heater motors
  - ii. rheostats
  - ii. valves
  - iii. switches

- iv. relays
- v. cooling fan motors
- vi. air conditioning units
- vii. thermostatic switches

### **The operating principles of heater, cooling systems and climate control**

#### a. Principles to include:

- i. conduction
- ii. convection
- iii. radiation
- iv. circulation
- v. boiling points
- vi. states of matter (Gas, liquid, solid)
- vii. temperature control
- viii. antifreeze mixtures
- ix. heat transfer

### **General**

The procedures for dismantling, removal and replacement of suspension/climate control system components

#### a. The preparation:

- i. testing and use of tools and equipment
- ii. electrical meters and equipment used for dismantling
- iii. removing and replacing suspension/climate control systems and components

#### b. Appropriate safety precautions:

- i. PPE
- ii. vehicle protection when dismantling
- iii. removing and replacing suspension/climate control systems and components

#### c. The importance of logical and systematic processes.

#### d. The inspection and testing of suspension/climate control systems and components.

#### e. The preparation of replacement units for re-fitting or replacement of suspension/climate control systems or components.

#### f. Identify the reasons why replacement components and units must meet the original specifications (OES):

- i. warranty requirements
- ii. to maintain performance
- iii. safety requirements

#### g. Refitting procedures.

#### h. The inspection and testing of units and systems to ensure compliance with manufacturer's, legal and performance requirements.

#### i. The inspection and re-instatement of the vehicle following repair to ensure customer satisfaction:

- i. cleanliness of vehicle interior and exterior
- ii. security of components and fittings
- iii. re-instatement of components and fittings

### **Procedures to prevent damage to the vehicle, components and contents when removing, storing and refitting components**

#### a. The methods that can be used to protect undamaged items to ensure they are removed and refitted without causing unnecessary damage:

#### b. The procedures for the correct storage of vehicle contents.

#### c. The process for identifying, evaluating and reporting of extra damage and items that may have broken when removed, refitted or unscheduled work

### **Types of clips and fixings**

- a. The following types of clips and identify reasons and limitations for their use:
  - i. speed
  - ii. 'c'
  - iii. 'd'
  - iv. 'j' type captive nut
  - v. 'r'
  - vi. 'u' type captive nut
  - vii. cable clip
  - viii. trim clips
- b. The following types of fixings and identify reasons and limitations for their use:
  - i. pop rivet
  - ii. plastic rivet
  - iii. plastic capture nut
  - iv. nut and bolt
  - v. shoulder bolt
  - vi. 'Nyloc' type nuts
  - vii. washers
  - viii. 'Spring' type washers
  - ix. self tapping screws and bolts
  - x. quick release plastic trim fastenings
  - xi. trim tapes
  - xii. adhesives and sealers

### **The processes involved when carrying out quality checks**

- a. Items that may have been 'workshop' soiled and describe processes for rectifying:
  - i. door cards
  - ii. seats
  - iii. carpets
  - iv. boot and bonnet trims
- b. Methods for checking gaps.

### **Mechanical Components**

- a. Suspension - Active Suspension
- b. Climate Control

## Assessment Requirements

### Unit MET05K – Knowledge of Removing and Fitting Vehicle Electronic Components and Systems

#### Content:

#### The different types of In Car Entertainment (I.C.E.) systems and components

- a. Systems and components must include:
  - i. radio CD and multi play units
  - ii. DVD players
  - iii. MP3 players
  - iv. speakers
  - v. aerial systems
  - vi. amplifiers
  - vii. V.D.U. screens
  - viii. Satellite Navigation
  - ix. communication units

#### The function of components in I.C.E. systems

- a. Systems include:
  - i. radios
  - ii. CD players
  - iii. video players
  - iv. DVD players
  - v. aerial systems
  - vi. speakers
  - vii. amplifiers
  - viii. VDU screens
  - ix. mobile communication units

#### The operating principles of I.C.E. systems

- a. Operation of entertainment systems speaker and aerial systems

#### The different lighting systems and technology

- a. Lighting systems should include:
  - i. Xenon lighting
  - ii. gas discharge lighting
  - iii. ballast system
  - iv. LED
  - v. intelligent front lighting
  - vi. blue lights
  - vii. complex reflectors
  - viii. fibre optic
  - ix. optical patterning

#### The function of components in lighting systems

- b. Lighting systems should include:
  - i. Xenon lighting
  - ii. gas discharge lighting
  - iii. ballast system
  - iv. LED
  - v. intelligent front lighting

- vi. blue lights
- vii. complex reflectors
- viii. fibre optic
- ix. optical patterning

**The operating principles of lighting systems**

- a. Operation of lighting systems

**The different types of integrated security/warning systems and components**

- a. Components to include:
  - i. control units
  - ii. alarm modules
  - iii. audible warning units
  - iv. immobiliser units
  - v. sensing units
  - vi. horn
  - vii. audible warning speakers explain how components and systems interact with other vehicle systems

**The function of component parts in integrated security and warning systems**

- a. Components to include
  - i. control units
  - ii. alarm modules
  - iii. audible warning units
  - iv. interior sensing systems
  - v. immobiliser units
  - vi. relays
  - vii. horns

**The operating principles of integrated security and warning systems**

- a. Operation of alarm systems and audible warning units.

**The relevant legislation relevant to security and warning systems**

- a. Find and apply all relevant legislation for the fitment and use of security and warning systems

**The operation and removal of the dash panel and auxiliary fittings**

- a. operation and removal of the dash panel and auxiliary fittings

**Procedures to prevent damage to the vehicle, components and contents when removing, storing and refitting components**

- a. The methods that can be used to protect undamaged items to ensure they are removed and refitted without causing unnecessary damage:
- c. The procedures for the correct storage of vehicle contents.
- c. The process for identifying, evaluating and reporting extra damage and items that may have broken when removed, refitted or unscheduled work

**Types of clips and fixings**

- a. The following types of clips and identify reasons and limitations for their use:
  - i. speed
  - ii. 'c'
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- vii. cable clip
- viii. trim clips
- b. The following types of fixings and identify reasons and limitations for their use:
  - i. pop rivet
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  - ix. self tapping screws and bolts
  - x. quick release plastic trim fastenings
  - xi. trim tapes
  - xii. adhesives and sealers

**The processes involved when carrying out quality checks**

- a. Items that may have been 'workshop' soiled and describe processes for rectifying:
  - i. door cards
  - ii. seats
  - iii. carpets
  - iv. boot and bonnet trims
- b. Methods for checking gaps.
- c. The process for checking and aligning headlamps:
  - i. address handling procedures for halogen bulbs
  - ii. address handling and health and safety issues relating to xenon bulbs and systems

**Vehicle Electronic Components**

- a. In Vehicle Entertainment – Audio & Visual
- b. Lighting – High Voltage Electronic/Electrical Directional Control
- c. Security Systems
- d. Dash Panel and Auxiliary Fittings



## Assessment Requirements

### Unit MET06K – Knowledge of Removing, Refurbishing and Fitting Trim Components

#### Content:

#### **The procedures relating to the removal, refurbishment and fitting of vehicle trim and fitment**

- a. How to remove and reinstate trim and fitments.
  - i. seating systems
  - ii. convertible roofs
- b. The tools and procedure for removing seat coverings.
- c. The tools consumables and procedure for reinstating seat coverings.
- d. The tools consumables and procedure for removing and reinstating convertible roof systems.

#### **The procedures to prevent damage to the vehicle, components and contents when removing, storing and fitting components**

- a. The methods that can be used to protect undamaged items to ensure they are removed and refitted without causing unnecessary damage.
- b. The procedures for the correct storage of vehicle contents.
- c. The process for identifying, evaluating and reporting of extra damage and items that may have broken when removed refitted or are unscheduled work.

#### **Types of clips and fixings**

- a. The following types of clips and identify reasons and limitations for their use:
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  - x. quick release plastic trim fastenings
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  - xii. adhesives and sealers

**The processes involved when carrying out quality checks**

- a. Items that may have been 'workshop' soiled and describe processes for rectifying:
  - i. door cards
  - ii. seats
  - iii. carpets
  - iv. boot and bonnet trims
- b. Methods for checking gaps.

**Trim Components**

- a. Seat Recovering
- b. Convertible Roofs