

# **Automotive Body Repair and Paint Work LEVEL III**

**Based On October, 2023, Curriculum Version I,**



**Module Title: Applying Paint Touch-up Techniques**

**Module code: EIS BRP3 M08 1023**

**Nominal duration: 50Hour**

**Prepared by: Ministry of Labor and Skill**

**October, 2023**

**Addis Ababa, Ethiopia**



## ACKNOWLEDGMENT

Ministry of Labor and skill wish to extend thanks and appreciation to the many representatives of TVET instructors and respective industry experts who donated their time and expertise to the development of this Teaching, Training and Learning Materials (TTLM).

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## Introduction to the Module

This unit describes the skills and knowledge required to prepare spray painting equipment and applies paint materials to minor vehicle paintwork damage. This unit involves preparing for the task, selecting and using specialist tools and equipment, mixing and matching paint and touching up painted surfaces to pre-damage condition, and completing workplace processes and documentation.

### This module covers the units:

- Prepare to apply paint touch-ups
- Apply touch-up paint
- Complete work processes

### Learning Objective of the Module

- Prepare to apply paint touch-ups
- Apply touch-up paint
- Complete work processes

### Module Instruction

For effective use this modules trainees are expected to follow the following module instruction:

1. Read the information written in each unit
2. Accomplish the Self-checks at the end of each unit
3. Perform Operation Sheets which were provided at the end of units
4. Do the “LAP test” giver at the end of each unit and
5. Read the identified reference book for Examples and exercise

## Unit one: Prepare to apply paint touch-ups

This unit is developed to provide you the necessary information regarding the following content coverage and topics

- Select and inspect paint materials
- Identify hazards and managed risks
- Prepare and match touch-up paint materials

This unit will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Perform Select and inspect paint materials
- Identify hazards and managed risks
- Perform Prepare and match touch-up paint materials

### 1.1. Select and inspect paint materials

Automotive paint is paint used on automobiles for both protective and decorative purposes.

Water-based acrylic polyurethane enamel paint is currently the most widely used paint for reasons including reducing paint's environmental impact.

#### Types of Paints

##### A. Oil-based paints: -

For oil-based paints, linseed oil was chosen because it is drying oil. When thinned with organic solvents such as turpentine for easier oil, its drying speed was enhanced.

To make the drying even faster, drying agents such as cobalt com were frequently added. Because the addition of driers was most done in hot or boiling oil, boiled linseed oil was preferable.

The dry of linseed oil paints was relatively rapid first, for several day immediately after application, and paint soon felt dry to the touch. Important to remember, however, that

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linseed oil paint continues precisely to crosslink, over decades and thus continues brittleness as the paint ages

**B. Water -based paints: -**

Water-based and solvent-based paint technologies are similar in their core composition. Both contain pigment for color, a binder to form the paint film, and a carrier that transports the pigment and binder through the spray gun onto the surface being painted.

The key difference is the carrier: solvent or water. When it's water, painters must adjust their mixing, spraying, and drying techniques. Water base paints were fairly strong, with the pigments well bounds in hide glue distempers', but they did not hold up to abrasions.

**C. Synthetic paints: -**

An alkyd resin is made by reacting a natural drying oil with a hard, synthetic material. A chemical used in very small amounts to control the growth of bacteria and fungi in paint. Biocides are used to prevent spoilage of paint in the can and to prevent fungal attack of the dried paint film.

**D. Vinyl paints**

Vinyl paint is a water-based paint containing vinyl plastic that is designed to stick to surfaces such as siding, floors, plastics and seat covers. The vinyl paint soaks into the surface of the material, becoming part of the original surface. Most vinyl paint is opaque and does not easily come off the surface. However, some surfaces resist the application of vinyl paint. There are many different formulas for vinyl paint, all designed for specific tasks. Benefits one of the main benefits of using vinyl paint rather than another formula of paint is that vinyl paint offers great coverage. While other paints require two or even three coats, one coat of vinyl paint is almost always as much as you need to apply. Because vinyl paint is flexible, it lasts longer on well-used areas. Even old vinyl seats that have been recovered with vinyl paint will remain painted after extended use.

### E. Undercoats

Undercoat and primer paint may seem to be one and the same. However, the two are actually poles a part. While the primer paint is used right before painting a new surface, the undercoat paint is used before painting a surface that has been painted in the past. In other words, an undercoat can be a primer but a primer is never an undercoat.

Since primers and undercoats are completely distinct therefore they must be chosen with care. Think of the project you have at hand before you purchase any one of the two. You can make your choice after taking into consideration the substrate in question that has to be painted. An undercoat's key purpose is to provide a smooth, uniform, even surface for topcoats. They are particularly useful with enamel topcoats, because they supplement topcoat film thickness and help impart a more substantial, denser finished look.”

### F. Lacquers

Often used to refer to the clear or colored finish that is used to furnish works to give them a more polished look whilst serving as a form of protection, lacquer is a type typically denotes a paint that dries up as the solvent evaporates leaving a hard, durable and shiny. Lacquer can provide glossy or resinous, which is usually hard and smooth. The clear type lacquers would provide a slightly yellow look to the material that they are applied on, whereas the colored once would give the desired hue. Lacquer coating is different from varnish coating due to the chemical construction, color and durability of it. Using lacquer to coat can be an ideal method to protect them against different harmful agents such as water and oil. This method also gives a very presentable look with options to customize it in anyway a person wants.

### G. Enamels

Enamel paint is paint that air-dries to a hard, usually glossy, finish, used for coating surfaces that are outdoors or otherwise subject to hard ware or variations in temperature; it should not be confused with decorated objects in "painted enamel", where vitreous enamel is applied with brushes and fired in a kiln. The name is something of a misnomer, as in

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reality, most commercially available enamel paints are significantly softer than either vitreous enamel or shovled synthetic resins, and are totally different in composition; vitreous enamel is applied as a powder or paste and then fired at high temperature. There is no generally accepted definition or standard for use of the term enamel paint, and not all enamel-type paints may use it.

## II. **Paint thinners and paint reducers**

Thinners and reducers in automotive paints are both solvents used to thin paint. These additives make the paint flow better so the result is even, professional coats. While the purpose of the two is basically the same, thinners and reducers are used on very different paints. Using the wrong one could ruin your pain.

The main difference between thinners and reducers is in the paint type that is being applied.

Thinners are for lacquer-based paints. Reducers are used for urethane-based paints. The two solvents are not interchangeable. For example, if the paint is an enamel-based product, do not use a thinner, but rather a reducer.

### A. Manufacturer Instructions

Each brand of automotive paint will come with instructions on which solvent to use and what the mixing requirements are for the paint and solvent. It is very important that you follow the directions from the manufacturer exactly to get the best results. The paint will tell you explicitly whether a thinner or a reducer should be used to thin the paint.

### B. Signs of Mismatched Solvents

Some symptoms that the solvent used was incorrectly matched to the paint include poor gloss and adhesion, dullness, chalking, cracks or splits, blisters, sanding swell, blushing or bleed-through of color.



## 1.2 Identifying hazards and managed risks

Here are some of the major hazards that might be due to working habits of the employees or to the general working conditions:

1. Smoking while handling dangerous materials such as gasoline or solvents. This can result in a major fire or explosion.
2. Careless or incorrect handling of paint, thinners, solvents, or other flammable fluids.
3. Blocking exits. Areas around exit doors and passage ways leading to exits must be kept free of all obstructions. If you wanted to get out in an emergency, for example, when a fire or explosion occurred---a blocked exit could mean serious injury or even death

### I. The hazards and types of PPE to control Eyes

Hazards: chemical or metal splash, dust, projectiles, gas and vapor, radiation. Options: safety spectacles, goggles, face shields, visors

#### A. Head

Hazards: impact from falling or flying objects, risk of head bumping, hair entanglement.

Options: a range of helmets and bump caps.

#### B. Breathing

Hazards: dust, vapor, gas, oxygen-deficient atmospheres.

Options: disposable filtering face piece or respirator, half or full-face respirators, air-fed helmets, breathing apparatus.

#### C. Protecting the body

Hazards: temperature extremes, adverse weather, chemical or metal splash, spray from pressure leaks or spray guns, impact or penetration, contaminated dust, excessive wear or entanglement of own clothing. Options: conventional or disposable overalls, boiler suits, specialist protective clothing, that is chain-mail aprons, high-visibility clothing.

#### D. Hands and arms

Hazards: abrasion, temperature extremes, cuts and punctures, impact, chemicals, electric shock, skin infection, disease or contamination.

Options: gloves, gauntlets, mitts, wrist cuffs, armllets

#### E. Feet and legs

Hazards: wet, electrostatic build-up, slipping, cuts and punctures, falling objects, metal and chemical splash, abrasion. Options: safety boots and shoes with protective toe caps and penetration resistant mid-sole, gaiters, leggings, spat.

### 1.3 Preparing and matching touch-up paint materials

- Filler is a material used to fill a damaged area
- Mixing board is the surface used to mix filler
- Light body filler is used as a very thin top coat of filler for final leveling
- Fiberglass body filler is used where rust repair or strength are important
- Using too much hardener is a common mistake
- Causes the filler to set before you have time to spread it, among other problems



Figure 1.1. Body filler

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Body filler is a two-part material that is mixed together and then applied over small dents in metal body parts. The body filler will heat up and cure in a few minutes so it can be sanded.

### Masking Materials

- Overspray is unwanted paint spray mist floating around the spray gun
- Masking paper is designed to cover body parts not to be painted
- Masking plastic should not be used next to area being sprayed
- Paint can drip onto the body surface
- Wheel masks are pre-shaped to fit over wheels
- Fine-line masking tape is very thin and smooth
- Produces a better paint part edge
- Duct tape protects parts when grinding or sanding
- Masking liquid or coating is usually a spray able material for protection from overspray
- Masking liquid washes off with soap and water

### Abrasives

- An abrasive is any material used for cleaning, sanding, smoothing, or material removal
- Grit refers to a measure of the size of particles on sandpaper or discs
- Grit numbering system denotes how coarse or fine an abrasive is
- Very coarse grit (16 to 60) quickly removes paint and takes it down to bare metal
- Generally start with the finest grit that is practical

### Scuff Pads

- Scuff pads are tough synthetic pads used to clean and lightly scratch surface paints and parts
- Handy for scuffing irregular surfaces
- Door jambs, inside of the hood and deck lids, etc.

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- Scuffing cleans and lightly scuffs these areas so the paint, primer or sealer will stick

Adhesives

- Adhesives bond parts to one another
- Weather strip adhesive holds rubber seals and similar parts in place
- Plastic adhesives or emblem adhesive is used to install emblems and trim onto painted surfaces
- Adhesive release agent is a chemical that dissolves most types of adhesives



Figure 1-0-1 Polish the paint surface

## Operation Sheet 1.

**Operation title:-** Selecting and inspecting paint materials

**Instruction:**

- ✓ Safe working area
- ✓ Properly operated tools and equipment
- ✓ Appropriate working cloths fit with the body

**Purpose:** Ensure a correct selection and inspection of paint materials

**Consumable Materials:** Safety poster, first aid kit, waste bin, pigment, or resin, solvent (thinner)

**Procedures:**

Step 1: Pre-Cleaning

Step 2: Initial Prep Sand

Step 3: Final Metal Prep

Step 4: Mix and Apply Filler

Step 5: Initial Sanding of Filler

Quality criteria:

Perform all activities to Select and inspect paint materials in accordance with the given procedures

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## Self-Check -1

### PART ONE: CHOOSE

**Choose the correct answer from the given alternative and write the answer on the space provided.**

\_\_\_\_\_ 1. IS used to refer to the clear or colored finish that is used to furnish works to give them a more polished look.

**A.** Undercoats paint   **B.** Lacquers paint   **C.** Enamel paint   **D.** Synthetic paints

\_\_\_\_\_ 2. Is used to describe oil-based covering products, usually with a significant amount of gloss in them.

**A.** Enamel paint   **B.** Vinyl paints   **C.** Thinners   **D.** Reducers

### **PART TWO: MATCHING**

**Match Column “A” with Column “B” Column “A” Column “B”**

- |   |                      |
|---|----------------------|
| 1. Its drying speed was enhanced                                    | A/ Water base paints |
| 2. Did not hold up to abrasions                                     | B/ oil based paints  |
| 3. Used right before painting a new surface                         | C/ Primer paint      |
| 4. Used before painting a surface that has been painted in the past | D/ Undercoat paint   |

## Unit Two: Apply touch-up paint

This unit to provide you the necessary information regarding the following content coverage and topics:

- Surface preparation methods
- touch-up paint
- Sand paint area
- glaze and sealant

This guide will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- apply Surface preparation methods
- perform touch-up paint
- perform Sand paint area
- select glaze and sealant

### 2.1. Surface preparation methods

When it comes to painting a car, any automotive professional will tell you the same thing: it's all in the preparation. Whether you're repairing a chip or re-spraying the whole car, prepping the paintwork is just as important as applying the paint, and plays a huge part in the quality of the end result.

There are three methods typically used to prepare a car's surface for painting: cutting, sanding and priming. From there, it's just a case of choosing the right paint colour and applying it evenly to the surface to achieve a smooth finish that's indistinguishable from the original paintwork.

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### Cutting

Cutting is a technique that involves using an abrasive compound to removes thin layers of paint. Cutting can be carried out as a prep step before you apply paint or afterwards to blend the new paint into the old.



Figure 2.1.cutting

### Sanding

Sanding removes the top layer of your car's paint using abrasive materials. One of the most important parts of paint preparation, it's well worth investing time to do it right for professional results. Depending on the job, sanding can be done with either sandpaper or an electric orbital sander, and you'll need to use different grades of paper depending on the task.



Figure 2.2. Sanding



## Priming

An essential step in painting metal surfaces, and one you'll need to do before applying any topcoat or color; priming seals the surface and creates a protective barrier, creating the ideal surface for the color coat paint to stick to. High-build primers contain high solids which help to smooth any imperfections on the bare metal.



Figure 2.3. Priming

## 2.2. touch-up paint

### 1. Clean the Surface of the Car

When doing paint repairs, you should always work with a clean surface. Make sure the car has been washed recently. Then, before beginning, clean the area with a spray glass cleaner. Finally, dry off the car thoroughly with a microfiber cloth.

### 2. Identify the Damage

Use a bright light to inspect the surface of the car, all along the body. It might be helpful to mark the damage spots with a small piece of masking tape. This will make it easier to identify them when you have the touch-up paint in hand.

### 3. Sand the Damaged Area

To prepare the damage for repair, the paint will need to be sanded. Use a 1500 to 2500 grit

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Sand paper or small sanding block to go over the area immediately around the chipped spot. Use short, light strokes back and forth when sanding the paint. Sand it until the paint has a uniform look and has lost its glossy shine. Rub the area with your finger; it should feel smooth around the chip.

#### **4. Clean with Paint Thinner**

Next, apply paint thinner to clean and prep the sanded area. Dip a cotton swab into a small amount of general purpose automotive paint thinner. Then, use the cotton swab to clean out the paint chip and over the sanded damage. It's important for the repair paint to stick well and stand up to the elements when driving. Applying a paint thinner will also help the touch-up product to adhere better.

#### **5. Apply the Touch-Up Paint**

Use a fine-tip paintbrush to apply a base coat that matches your car color. Add a little paint to the tip of the brush. Then, dab it lightly over the area that you prepped. Use just a small amount at a time. As the paint dries, you may notice that it loses volume. Wait until the paint layer has dried to determine if another coat of base paint will be needed before moving onto the clear coat.

#### **6. Ensure the Surface Is Smooth**

For deeper chips, the paint will need to be built up to be flush with the rest of the car's surface. Do this in stages, applying paint then allowing it to dry before adding another layer.

#### **7. Apply the Clear Coat**

When the base coat has dried completely, it needs to be finished and sealed with a clear coat. Use a clean fine-tipped paintbrush and the same dabbing technique as before. Let it dry partially before deciding if an additional clear coat will be needed.

#### **8. Let the Touch-Up Paint Cure**

Give it at least 48 hours to completely dry and harden.

#### **9. Polish the Paint**

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After the paint has fully cured, use a car polish compound to complete the job. This will give the repaired area a new-paint glossy shine.

### **Paint mixing procedures**

The mixing container is another method that allows to easily calculate mixture ratios, following the rules printed on the container for each component. BESA has mixing containers for different mixing ratio of component A and component B (1:1, 2:1, 3:1, 4:1, etc.) ratios. There are different sizes or capacity containers depending on the amount of product you want to apply.

Inside the mixing containers there is a fast paint preparation system, called FPP (Fast Paint Preparation). This system includes a regulated container and a flexible single-use container, which reduces the paint preparation time, and suppresses the cleaning process of the container.

### **Mixtures with volume rules**

As in the case of mixing containers, you must know beforehand the mixing ratio to be made (Packaging or technical data sheet). This is the least recommended method among those mentioned, and may result in greater inaccuracies in the paint mixture.

There are rules with different mixing ratios (2:1, 3:1, etc.). Volume rules require using a non-conical vertical container or recipient to obtain an accurate ratio of paint or clear coat, hardener and thinner. The size of the container should be taken into account for a correct mixing ratio.



Figure 2.4. Paint mixing container

### Paint application methods

There are dozens of different techniques available to manufacturers and finishers when applying paint or finish to a manufactured product. There are specific advantages and drawbacks to each of the application methods and many of them have several variations that are best-suited for specific circumstances. This makes it imperative for you to understand your logistical and budgetary requirements in order to select the right method for your operation. Take a look below, where we breakdown the benefits and drawbacks of the most common types of application methods

### Spray Methods

Spraying is the most prevalent paint and finish application technique among industrial manufacturers due to its versatility and economic viability. There are a variety of different types of spray methods currently in use, including:

- **Air-atomized Spray:** Air-at Air-atomized applications are the conventional approach to spray painting. The applicator consists of a traditional spray gun that combines compressed air with liquid flow to create a pressurized mist that coats the object. Since the equipment can be adjusted and customized to suit the needs of the operator, air-atomized applications are highly flexible and can be used on almost any kind of substrate.

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- **Airless Spray:** Rather than mixing liquid paint with compressed air, airless application equipment simply forces the liquid coating through a narrow opening to create pressure. This method propels paint particles at a lower velocity than conventional air-atomized equipment, so there is less loss of paint through overspray.
- **Electrostatic applications** are a relatively modern innovation that offers exceptional transfer efficiency compared to other spray techniques. The equipment charges the paint particles with high voltage, causing them to be attracted to the surface of the part and will actually wrap around the part which increases transfer efficiency. This allows for a smooth and solid coat with minimal effort, even for objects with corners and contouring.
- **High-volume, Low-pressure (HVLP):** HVLP spray equipment utilizes spray gun atomization technology that propels large quantities of low-pressure air to the gun applicator. Since the paint is released at a lower velocity, this technique yields less overspray and blowback than conventional air-atomized equipment. While the apparent benefits seem advantageous, it's also important to note that HVLP applications require more experienced painters due to the higher transfer efficiency.
- **Brushing:** As the name implies, brushing uses a paintbrush to apply paint or finish to a component. The paint's consistency is a key factor in successful brushing applications. Thin paints may not cover the surface adequately while thicker paints can pull and rope under the brush. Without proper consistency, brush marks will likely remain after the application is completed. The risk of a lower-quality finish means that brushing is typically not used for decorative finishes
- **Dipping:** Dipping is a technique that is most often used for applying primers and involves completely submerging the parts in a tank. This is effective for fully coating components, which makes it a great choice for applying protective coatings. Fully immersing the parts ensures that all areas will be sufficiently coated; however, this

typically does not provide a high-quality finish due to drips when the parts are hung to dry. Additionally, dipping is a poor choice for finishing larger components as the size of the tank becomes cost-prohibitive. Dipping is most often used in factories and at large repair stations.

### **Paint drying methods and procedures**

There are various drying methods used in the automotive industry, including air-drying, force-drying, and infrared drying.

- Air-Drying

Air-drying is the most common and traditional method of drying automotive paint. It involves allowing the paint to dry naturally through exposure to air. Air-drying is a slower process, and it can take up to several days to complete.

- Force-Drying

Force-drying involves the use of specialized equipment to force dry the paint. This method is faster than air-drying and requires the use of a drying booth, where heated air is circulated around the painted surface.

- Infrared Drying

Infrared drying is a newer method that uses infrared radiation to dry the paint. This method is faster than force-drying and can dry the paint in minutes.

### **Factors Affecting the Drying Process**

Several factors can affect the drying process, including temperature, humidity, airflow, and the type of paint.

- Temperature

Temperature plays a crucial role in the drying process. Solvent-based paint requires higher temperatures for drying than water-based paint. The optimal temperature for drying automotive paint is typically between 60 and 75 degrees Fahrenheit.

- Humidity

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Humidity can also affect the drying process. Higher humidity can slow down the drying process and cause the paint to take longer to dry. An optimal humidity range for automotive paint drying is between 40% and 60%.

- Airflow

Airflow is critical in the drying process as it helps to circulate the air around the painted surface, expediting the drying process. Proper airflow can help to reduce the drying time and improve the overall finish of the paint job.

### **2.3. Sanding paint area**

#### **Cleaning and Sanding the Surface**

Focus on deep cleaning the area where the paint is chipped. Making sure the area is clean will help you identify all the spots that need to be touched up and will reduce the risk of getting dirt and grime in the new paint.

✓ Use car washing soap, water, and a clean, soft cloth to clean the scratched area.

✓ be sure to thoroughly dry the area that is scratched after you wash it

#### **Check for rust and remove any you find.**

Look at the scratched area for discoloration on the metal. If you find an area that is dark red or brown, it is likely rust. Use sand paper to remove all areas of discoloration and then wipe down the area with a dry cloth to remove any dust Note: Removing the rust will help minimize the chance of rust developing under the paint in the future Apply a wax and grease remover to the area being fixed.

#### 2.4. Galvanizing and sealant

Galvanizing is the process of coating steel with zinc. It is one of the principal methods of corrosion protection applied during the manufacturing process. On galvanized steel, the zinc forms a natural barrier between the steel and the atmosphere. As the zinc corrodes a layer of zinc oxide will form on the surface exposed to the atmosphere. Unlike iron oxide, or rust the zinc oxide adheres to the zinc coating tightly forming a natural barrier between the zinc and the atmosphere.

- Glazing putty is for filling small holes or sand scratches
- Spot putty has more solids than glazing putty
- Should not be used for large surface depressions
- Two-part putty comes with its own hardener
- Some two-part putties can be applied over paint to reduce sanding time Sealers
- Sealers prevent water and air leaks between parts
- Seam sealers make a leak proof joint between body panels
- Tube sealers are applied from a tube or with a caulking gun
- Silicone sealers are not paintable and should not be used in auto body repair

Ribbon sealers must be worked onto the parts with your fingers

- Bleeding or bleed through means colors in old prime coat of paint seep into new paint
- Sealer is a mid-coat between the paint and the primer or old paint to prevent bleeding
- Sealers cannot be used as a primer
- Primer-sealer provides the same protection as primers but also seals over a sanded old finish to provide uniform color holdout
- Primers and Sealers
- Plain primer is a thin undercoat designed to provide adhesion for the paint
- Used when the surface is smooth
- Self-etching primer has acid in it to prepare bare metal so the primer will adhere
- Epoxy primer is a two-part primer that cures fast and hard

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- Greatly increases body filler adhesion and corrosion resistance over bare metal



Figure 2.5. Primer-sealer

Primers are needed for the paint to bond to the substrate securely. There are many variations such as primer-sealer that increases adhesion and also blocks out any color or chemical differences of the old paint

- Apply up to 3-4 coats of paint, or as your supplies allow. If you run out around coat two, you will need to get more to ensure proper coverage and an even coat.
- Before completing the last pass with topcoat, wipe down the car and remove any powdery residue that may have built-up with 2000-grit sandpaper. Wipe the car down again with a clean rag. The Application Stroke The proper stroke is most important in obtaining a good refinishing job. To obtain a good stroke, proceed as follow:

✓ Hold the spray gun at the proper distance from the surface Short- the high velocity air tends to ripple wet film Long- a greater percent of thinner evaporated (dry film result), loss of material

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- ✓ Hold the gun level and perpendicular to the surface, otherwise uneven paint film will result
- ✓ Do not fan the gun and do not use wrist motions if a uniform film is desired. The only time it is permissible to fan the gun is on a small spot spray where the paint film at the edges of the spot should be thinner than the center portion
- ✓ Move the gun with a steady deliberate pass, about 1 foot per second. Moving the gun too fast will produce a thin film, while moving it too slowly will result in the paint running.
- ✓ Release the trigger at the end of each pass
- ✓ Difficult areas such as corners and edges should be sprayed first

Generally, start at the top an upright surface such as a door panel. The spray gun nozzle should be level with the top of the surface, this means that the upper half of the spray pattern will hit the masking

The second pass is made in the opposite direction with the nozzle level at the lower edge of the previous pass and the other half is sprayed on the unpainted area. The last pass should be made with the lower half of the spray pattern below the surface being painted

The procedure just followed is called a Single Coat. For a double coat, repeat the single coat procedure immediately. Generally, two or more double coats are required to properly apply a lacquer topcoat. Allow for flash time (the time required for the solvents to evaporate and the finish to dull slightly.) or several minutes between coats.

## Operation Sheet 2.

Operation title: Cleaning Paint Tools

### Instruction:

- ✓ Safe working area
- ✓ properly operated tools and equipment
- ✓ Appropriate working cloths fit with the body

**Purpose:** Ensure a correct Cleaning Tools

**Required tools and equipment:** Car body, Hand brush

**Consumable Materials:** Safety poster, first aid kit, waste bin, Thinner, Primer and Base Coat/clear coat, Paints, Hardener, Wax remover, Rolling Brush, Mixing and Painting Room

### Procedures:

Steps 1: Wear protective clothing and goggles

Steps 2: Gather the cleaning tools for designated area.

Steps 3: Segregate the tools according to the kind of dirt they have.

Steps 4: Measure and pour enough amount of cleaning solvent to the washing pan.

Steps 5: Submerge the tools in the washing pan.

Steps 6: Use paint brush to remove the dirt from the tools

Steps 7: Get the tools from the washing pan and wipe them with rags until dry.

Steps 8: Arrange the tools in designated rack or cabinet.

Steps 9: Clean and store all materials used for cleaning

### Quality criteria:

Perform all activities to Clean Tools in accordance with the given procedures

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## Operation Sheet 2.1

### Operation title:- Clean and remove rust from the Surface

#### Instruction:

- ✓ Safe working area
- ✓ Properly operated tools and equipment
- ✓ Appropriate working cloths fit with the body

**Purpose:** Ensure a correct selection and inspection of paint materials

**Required tools and equipment:** Car body, Hand brush

**Consumable Materials:** Safety poster, first aid kit, waste bin, Thinner, Primer and Base Coat/clear coat, Paints, Hardener, Wax remover, Rolling Brush, Mixing and Painting Room

#### Procedures:

**Steps 1:** Clean and Sand the Surface



**Steps 2:** Check and remove rust

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**Steps 3:** Apply a wax and grease remover to the area being fixed



**Steps 4:** Sand the area to prep the surface



**Quality criteria:**

Perform all activities to Select and inspect paint materials in accordance with the given procedures

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## Self-Check -2

### PART ONE: CHOOSE

**Choose the correct answer from the given alternative and write the answer on the space provided.**

\_\_\_\_\_ 1. Which of the following materials is used to mix most paints? A. A reducer B. Thinner C. Hardener D. All are the correct answer

\_\_\_\_\_ 2. It is a finishing process that involves the use of a loose abrasive on a wheel.  
A. Buffing B. filling C. Polishing D. repainting

### PART TWO: SHORT ANSWER

**Write the short answer on the space provided**

1. If the paint is too thin, what will happen?

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2. If the paint is too thick, what will happen?

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3. What is the difference between Base Color (Basecoat) and clear coat in paint matching?

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## Unit Three: Complete work processes

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Conduct final inspection
- Clean work area

This guide will also assist you to attain the learning outcomes stated in the cover page.

Specifically, upon completion of this learning guide, you will be able to:

- Conducting final inspection
- Clearing work area

### 3.1. Conducting final inspection

When your car paint gets chipped, it's important to get it fixed with touch up paint. To do this correctly, you'll need to find the right paint color and get the essential materials. Once you have the necessary tools, start by applying the primer followed by the base coat. Next, use touch up paint to fix the affected area before applying a clear coat. You can complete the process by polishing the entire car surface. After completing these steps, your car needs a final cleaning over the treated area. Remember to be patient and sand as much as needed to ensure that the new paint matches the body as closely as possible. You can also try practicing on some scrap metal first. After you've finished, apply a fresh coat of wax for a consistent shine across the entire vehicle.

### 3.2. Clearing work area

Sorting is the process of arranging data into meaningful order so that you can analyze it more effectively. For example, you might want to order sales data by calendar month so that you can produce a graph of sales performance. Removing waste and scrap Wastes are unwanted or unusable materials. Waste is any substance which is discarded after primary use, or is worthless, defective and of no use Scrap consists of recyclable materials left over from product

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manufacturing and consumption, such as parts of vehicles, building supplies, and surplus materials. Unlike waste, scrap has monetary value, especially recovered metals, and non-metallic materials recovered for recycling. Ways to Dispose of Waste without Harming the Environment Some of us may not know much about garbage aside from the fact that you occasionally set it outside once a week. However, what many really do not know is that garbage is slowly becoming one of the most important industries in the world. The main reason for that is that the garbage industry is not actually a crowded market meaning there is a small number of companies that do offer a good recycling system. In addition, recycling is the only way towards a zero-waste future.

The way of waste disposal can discuss below:

#### 1. Recycling

Recycling is the process of collecting and processing materials that would otherwise throw away as trash and turning them into new products. Recycling can benefit your community and the environment.

#### **Benefits of Recycling**

- Reduces the amount of waste sent to landfills and incinerators
- Conserves natural resources such as timber, water and minerals
- Increases economic security by tapping a domestic source of materials
- Prevents pollution by reducing the need to collect new raw materials
- Saves energy

#### 2. Composting / Disposable

The term is also sometimes used for products that may last several months (e.g. disposable air filters) to distinguish from similar products that last indefinitely (e.g. washable air filters). The word disposables is not to be confused with the word consumables, which is widely used in the mechanical world. For example, welders consider welding rods, tips, nozzles, gas, etc. to be consumables, as they last only a certain amount of time before needing to replace. Consumables needed a process to take place, such as inks for printing and welding rods for welding, while disposable products are products that can throw away after it becomes damaged or otherwise unusual. Here is some examples

- Waxes
- Glues

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- Solvents
- Paint cans
- Paint thinners
- Oven cleaners

### 3. Reusing

Reuse of waste means any operation by which products or components that are not waste used again for the same purpose for which they conceived.

- Scrap metal
- Oil filters (same type)
- Car batteries
- Car tires
- Car engines
- Plastic components
- Windows and windscreen

## Self-Check -3

### PART ONE: CHOOSE

**Choose the correct answer from the given alternative and write the answer on the space provided.**

\_\_\_\_\_ 1. consists of recyclable materials left over from product manufacturing and Consumption, such as parts of vehicles, building supplies, and surplus materials

- A. Waste                      B. Product                      C. Scarp D. None

\_\_\_\_\_ 2. Scrap value is also referred to as

- A. Residual value      B. Salvage value      C. Break-up value      D. All correct

### PART TWO: Test: True or False Questions

1. Wastes are unwanted or unusable materials. It may any substance which is discarded after primary use, or is worthless, defective and of no use
2. Disposable waste is also sometimes used for products that may last several months

### PART THREE: SHORT ANSWER

**Write the short answer on the space provided**

1. What are the five types of waste?
2. What is Scrap value?

## LAP Test

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

Instruction I: Given necessary templates, tools and materials you are required to perform the following tasks within 1 hour.

Task 1: Cleaning Tools

Task 2: Clean and remove rust from the Surface

Task 3: Priming and Painting Chipped Areas for hand brushing

Task 4: Paint mixing procedures

Task 5: Apply Touch-Up Pain

## Reference/Text Book

1. . Powloski J, “Vehicle Body Engineering”, Business Books Ltd., London 1989.
2. . John Fenton, “Vehicle body layout and analysis”, Mechanical Engg. Publication ltd, London, 1982.
3. Kohli P. L, “Automotive Chassis & Body”, Papyrus Publishing House, New Delhi, 2010.
4. Wolf-Heinrich Hucho, “Aerodynamics of Road Vehicles” SAE International,USA,1998.
5. Robinson A.,Livesey W. A, “The Repair of Vehicle Bodies”, Butterworth - Heinemann Ltd,1989

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6. Sumantran V. and Gino Sovram, “Vehicle Aerodynamics”, SAE International, USA, 1994.
7. John Fenton, “Vehicle Body Layout & Analysis”, Hutchinson, London, 1998.

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