VEHICLE BODY REPAIRING AND PAINTING

Level II

Learning Guide # 40

Unit of Competence: - Apply Paint Touch- up Techniques

Module Title: Applying Paint Touch- up Techniques

LG Code: EIS VRP2 M12 LO1-LG-40

TTLM Code: EIS VRP2 TTLM 0919 v1

LO 1: Prepare for work

Instruction Sheet	Learning Guide # 40

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

- Using work instructions to determine job ***requirements***
- Reading and interpreting job specifications
- Observing **Workplace Health and Safety (WHS)** requirements
- Selecting and inspecting materials
- Identifying and checking hand, power tooling and safety equipment
- Determining procedures to minimize waste material.
- Identifying procedures to maximizing energy efficiency

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

Specifically, upon completion of this Learning Guide, **you will be able to –**

- Use Work instructions to determine job ***requirements***, including method and material type.
- Read and interpret Job specifications.
- *Observe* ***Workplace Health and Safety (WHS)*** requirements, including personal protection throughout the work
- Select and inspect Materials for quality.
- Identify and check Hand, power tooling and safety equipment for operation.
- Determine Procedures to minimise waste material.
- Identify Procedures for maximising energy efficiency while completing the job.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 22
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1” **in page 5**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).

6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.
8. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
9. Accomplish the “Self-check 2” **in page 7**
10. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 2).
11. Read the information written in the “Information Sheets 3 . Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
12. Accomplish the “Self-check 3” **in page 10**
13. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 3).
14. Accomplish the “Self-check 4” **in page 19**
15. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 4
16. Accomplish the “Self-check 5” **in page 24**
17. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 5
18. Accomplish the “Self-check 6” **in page 26**
19. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 6
20. Accomplish the “Self-check 7” **in page 29**
21. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 7
22. Accomplish the “Self-check 8” **in page 31**

Information Sheet-1	Introduction

1.1. Introduction

Automotive touch up repair" means the application of automotive topcoat finish materials to cover minor finishing imperfections less than or equal to one inch in diameter

A car that is used is bound to obtain a few paint chips. Debris from the road kicks up while driving to chip the sides, adverse weather can wreak havoc on the hood, and accidents can happen any time. These chips are usually too small to warrant a new paint job or professional assistance at all. However, if the affected **area is smaller than a pencil eraser**, you can use touch-up paint to repair the damage yourself

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define what automotive touch up repair" means?

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-2	Using Work instructions

1.2. Work instructions:-

- A document describing specific activities and tasks containing a great amount of detail.
- As a component of a process, defines how one or more activities in a procedure should be executed in detail, using technology or other resources
- A Document containing detailed instructions that specify exactly what steps to follow to carry out an activity. A work instruction contains much more detail than a Procedure and is only created if very detailed instructions are needed.
- Work Instructions describe how the activity is performed.

How to write step-by-step instructions

- Describe the detailed instructions for the work. Identify roles and responsibilities.
- Give each activity its own title.
- One role activities. Don’t combine two roles in the same step.
- Number each step.
- Use consistent formatting.
- Document control-Version#, Date ,Doc name, Detail of change, Review date, etc.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define what work instruction means and how it defers from procedure?

2. Write/List step by step work instructions

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-3	Reading and interpreting job specifications

1.3. Job specifications

A job specification is a written statement of educational qualifications, specific qualities, level of experience, physical, emotional, technical and communication skills required to perform a job, responsibilities involved in a job and other unusual sensory demands. It also includes general health, mental health, intelligence, aptitude, memory, judgment, leadership skills, emotional ability, adaptability, flexibility, values and ethics, manners and creativity, etc.

I. Purpose of Job Specification

- Described on the basis of job description, job specification helps candidates analyze whether are eligible to apply for a particular job vacancy or not.
- It helps recruiting team of an organization understand what level of qualifications, qualities and set of characteristics should be present in a candidate to make him or her eligible for the job opening.
- Job Specification gives detailed information about any job including job responsibilities, desired technical and physical skills, conversational ability and much more.
- It helps in selecting the most appropriate candidate for a particular job.

II, Job Specification Information: -

The first step in the programme of job specification is to prepare a list of all jobs in the company and where they are located. The second step is to secure and write up information about each of the jobs in a company. Usually, this information about each of the jobs in a company. Usually this information includes:-

- Physical specifications: - include the physical qualifications or physical capacities that vary from job to job. Physical qualifications or capacities include physical features like height, weight, chest, vision, hearing, ability to lift weight, ability to carry weight, health, age, capacity to use or operate machines, tools, equipment etc.
- Mental specifications: - include ability to perform, arithmetical calculations, to interpret data, information blue prints, to read electrical circuits, ability to plan,

reading abilities, scientific abilities, judgment, ability to concentrate, ability to handle variable factors, general intelligence, memory etc.

- Emotional and social specifications: - are more important for the post of managers, supervisors, foremen etc. These include emotional stability, flexibility, social adaptability in human relationships, personal appearance including dress, posture etc.
- Behavioral Specifications: - play an important role in selecting the candidates for higher-level jobs in the organizational hierarchy. This specification seeks to describe the acts of managers rather than the traits that cause the acts. These specifications include judgments, research, creativity, teaching ability, maturity trial of conciliation, self-reliance, dominance etc.

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Which of the following is true about job specification?

A / It .helps candidates analyze whether are eligible to apply for a particular job vacancy or not. B/ It give detailed information about any job

C/ It give detailed information about any job D/ All are correct answers.

Match “”Column” A” with Column “B”

Column “A”	Column “B”
_____1. Capacity to use or operate machines, tools, equipment etc	A/ Emotional and social specifications
_____ 2. Play an important role in selecting candidates for higher-level jobs in the organizational hierarchy	B/ Physical specifications
	C/ Behavioral Specifications
_____3. More important for the post of managers,. supervisors, foremen etc	
_____4. Ability to perform, arithmetical calculations, to interpret data, information blue prints, to read electrical circuits, ability to plan	D/ Mental specifications
	E/ **Job Specification**

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-4	Observing Workplace Health and Safety (WHS) requirements,

1.4. Workplace Health and Safety (WHS) requirements

Safety means protecting yourself and others from possible danger and injury. You do not want to get hurt, and you do not want to hurt others. But you could hurt yourself or others if you become careless and thoughtless

Work Safety

A. Knowledge during the work

- Always work safely to prevent injuries.
- Take care to prevent accidents to yourself.

B**. Factors of the accidents**

- Accidents due to human factors: Accidents caused by the improper use of a machine or tool, by wearing inappropriate clothes, or by the carelessness of the technician.
- Accidents due to physical factors: Accidents caused by the malfunctioning of a machine or tool, the lack of integrity of a safety device, or a poor working environment.

C. In the Workshop

- Always keep your workplace clean to protect yourself and others from injury.
- Do not leave tools or parts on the floor where you or anyone else. They might trip over them. Make a habit of putting them on a workbench or work stand.
- Immediately clean up any spilled fuel, oil, or grease to prevent yourself or others from slipping on the floor.
- Do not assume an uncomfortable posture while working. It will not only affect your work efficiency but it could cause you to fall and injure yourself.
- Be extremely careful when handling heavy objects because you could be injured if they dropped on your feet. Also, remember that you could hurt your back if you try to lift an object *that* is too heavy for you.
- To move from one area of the workplace to another, make sure to walk on a designated walkway.

1.4.1. Protective clothing and equipment

Introduction

Hazards exist in every workplace in many different forms: sharp edges, falling objects, flying sparks, chemicals, noise and a myriad of other potentially dangerous situations. . Controlling a hazard at its source is the best way to protect employees

Personal protective equipment, commonly referred to as “PPE”, is equipment worn to minimize exposure to a variety of hazards..

All PPE clothing and equipment should be of safe design and construction, and should be maintained in a clean and reliable fashion.

PPE is defined in the Regulations as „all equipment (including clothing affording protection against the weather) which is intended to be worn or held by a person at work and which protects him against one or more risks to his health or safety’,

I. Personal protective equipment

Personal protective equipment (PPE) is **protective clothing**, helmets, goggles, or other garments or **equipment** designed to protect the wearer's body from injury or infection. The hazards addressed by **protective equipment** include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter.

II. Types of personal **protective equipment**

- Safety Sign for EYES PROTECTION: *It emphasized to wear eye protection PPE such as safety spectacle, goggles, face shield or visors*

Goggles

- Safety Sign for HEAD PROTECTION: *It emphasized to wear head protection PPE such as helmets or bump cups*

Bump Cups



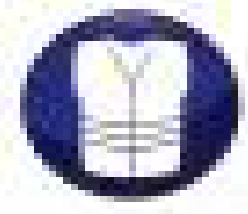
- Safety Sign for breathing protection: *it emphasized to wear breathing protection ppe such as disposable filtering face piece or respirator, half or full-face respirator, air-fed helmets, or any breathing apparatus.*

Disposable Filtering Face Piece or Respirator



- Safety Sign for body protection: *It emphasized to wear body protection PPE such as conventional or disposable overalls, boiler suits, specialist protective clothing, that is chainmail aprons, high-visibility clothing.*

Conventional Overalls



- Safety Sign for HANDS/ARMS PROTECTION: *It emphasized to wear hands/arms protection PPE such as gloves, gauntlets, mitts, wrist cuffs, armlets.*

Gloves made of cotton or leather

- Safety Sign for FEET/LEGS PROTECTION: *It emphasized to wear feet/legs protection PPE such as safety boots and shoes with protective toe caps and penetration resistant mid-sole, gaiters,*

Safety boots or shoes with protective toe

1.4.2. Use of tooling and equipment

Each tool is precisely designed for a specific purpose, so choosing the correct tool will also decrease the amount of effort required to get a job done right without causing damage to either the equipment or the surface being worked on.

For safely working with hand and power tools.

1. **Inspect tools**. Never issue or use a damaged or defective hand or power tool. Always make sure they are in good working order before and after each use.
2. **Pick the right tool**. Make sure you are using the correct tool for the task at hand.
3. **Don't alter your tools**. Never remove guards or disable safety devices on power tools. Don't paint or cover up your tools as this could prevent you from noticing chips or cracks.
4. **Handle with care**. Tools are not toys. Never throw or toss a tool in the direction of or directly to a coworker. Never use electrical cords to lower or lift a tool to get it to a workspace.
5. **Keep your distance**. When working with hand and power tools be sure you have enough room to safely operate without coming into contact with other objects or coworkers.
6. **Pick up after yourself**. Don't leave idle hand tools lying around the job site. They can lead to tripping or be accidentally knocking on someone's head.

7. **Unplug and disconnect**. Don't leave electric power tools plugged in when not in use, when making adjustments such as replacing blades and bits, or loading fasteners.
8. **Keep your workspace clean.** A cluttered floor can lead to accidental trips or falls which can be extremely dangerous when working with hand and power tools.
9. **Get trained up**. Make sure you and your employees are thoroughly trained on the proper use of hand and power tools required for the task at hand.

1.4.3. Handling of material

Material handling is the movement, protection, storage and control of materials and products throughout manufacturing, warehousing, distribution, consumption and disposal. Material handling:- The National Safety Council suggests employers relay the following information to employees to help reduce workplace incidents when handling and moving materials: Avoid lifting materials from the floor or while seated. Make use of available handling aids. Refrain from using sudden or jerky movements

In early systems of handling materials, goods were handled as single units in a discontinuous manner. These early methods treated the three basic stages of handling—materials collection, manufacturing, and product distribution—as discrete steps, and materials were moved in individual rather than bulk units.

1.4.4. Use of fire-fighting equipment

F ire Prevention

Gasoline is used so much in the shop that people forget it is very dangerous if not handled properly. A spark or lighted match in a closed place filled with gasoline vapor can cause an explosion. Even *the* spark from a light switch can set off an explosion. So you must always be careful with gasoline. Here are some tips.

- There will be gasoline vapors around, if gasoline is spilled or a fuel line is leaking.
- You should keep the shop doors open or keep the ventilating system going.
- Wipe up the spilled gasoline eat once, and put the rags outside to dry.
- Never smoke or light a cigarette around gasoline.
- When you work on a leaky fuel line, carburetor, or fuel pump, catch the leaking gasoline in a container or with rags.
- Put the soaked rags outside to dry.
- Fix the leak as quickly as possible. And don't make sparks around the car, for example, by connecting a trouble light to the battery.
- Gasoline should be stored in an approved safety container.

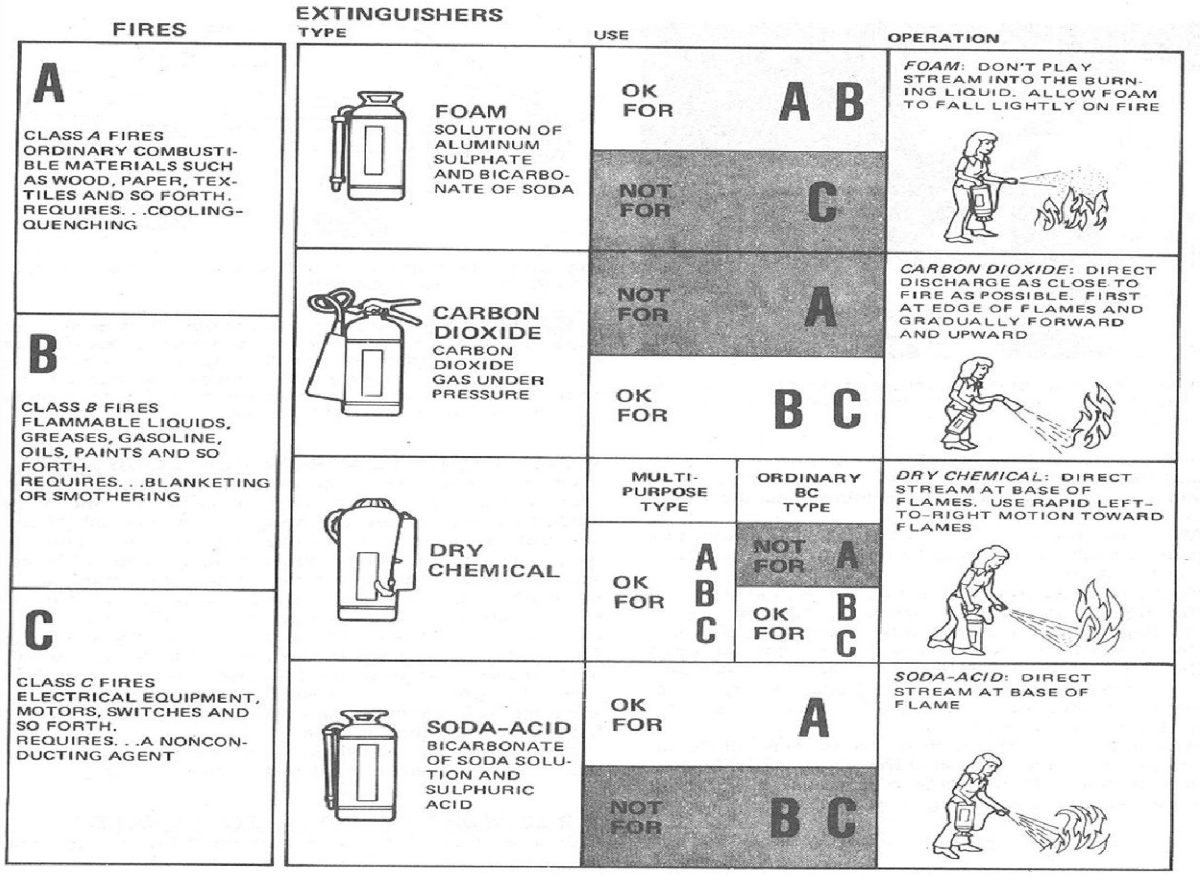
Never store gasoline in a glass container. They could break and could cause an explosion and fire. Oily rags can also be a source of fire. They can catch fire without a spark or flame. Oily rags and waste should be put into a special safety container where they can do no harm

Gasoline and all flammable liquids should always store in an approved safety containers.

Recommended container for Gasoline or flammable liquids

Fire Extinguishers

Note the location of the fire extinguishers in the shop. Make sure you know how to use them. The quicker you begin to fight a fire, the easier it is to control. But you have to use the right kind of fire extinguisher, and use it correctly. The chart explains this. Talk over any questions with your instructor



1.4.5. Hazard control and hazardous material and substances

Factors of the accidents

1. Accidents due to human factors: Accidents caused by the improper use of a machine or tool, by wearing inappropriate clothes, or by the carelessness of the technician.
2. Accidents due to physical factors: Accidents caused by the malfunctioning of a machine or tool, the lack of integrity of a safety device, or a poor working environment.

Hazard due to Faulty Working Habits or Conditions

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

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
- ***Head***
  - ✓ *Hazards*: impact from falling or flying objects, risk of head bumping, hair entanglement.
  - ✓ *Options*: a range of helmets and bump caps.
- ***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
- ***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.
- **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, armlets
- **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.

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

I/ Choose the correct answers

1. Which of the following is true about safety in the work shop?
   A/ Always keep your workplace clean
   B/ Do not leave tools or parts on the floor where you or anyone else
   C/ be extremely careful when handling heavy objects
   D/ All are the correct answers
2. The movement, protection, storage and control of **materials** and products throughout manufacturing, warehousing, distribution, consumption and disposal is called :-
   A/ **Workplace environment and safety** **B/ Handling of material**
   C/ Personal protective equipment **D/ Fire Prevention**
3. *Hazards*: chemical or metal splash, dust, projectiles, gas and vapor, and radiation are controlled by :- A/ safety spectacles, B/ goggles, C/ face shields, D/ visors E/ All are the correct answer

II/ Give definitions of the following

A/ Safety
B/ PPE
C/ First aid

III Give sort answer/fill the blank space

A/ Mention at least three safety sign for breathing protection.

a/ _____
b/ _____
c/ _____

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-5	Selecting and inspecting materials

1.5. Selecting and inspecting materials

1.5.1. Paints'

Show car paint professionals often have certain techniques that they use when painting vehicles. These techniques not only provide a good exterior finish, but also protect the metal from oxidation.. Some paints that are commonly used by paint pros include Hi-Grade Automotive Enamel, Durability Plus Catalyzed Enamel, Single-use Polyurethane paints with sealers and base coat with urethane clear coats.

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

1.5.1.2. **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.

1.5.1.3. 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.

1.5.1.4. 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.

1.5.2. Undercoats

Undercoat and primer paint may seem to be one and the same. However, the two are actually poles apart. 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."

1.5.3. 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 coloured once would give the desired hue. Lacquer coating is different from varnish coating due to the chemical construction, colour 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.

1.5.4. 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 wear 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 reality, most commercially available enamel paints are significantly softer than either vitreous enamel or stoved 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.

Typically the term "enamel paint" is used to describe oil-based covering products, usually with a significant amount of gloss in them, however recently many latex or water-based paints have adopted the term as well. The term today means "hard surfaced paint" and usually is in reference to paint brands of higher quality, floor coatings of a high gloss finish, or spray paints. Most enamel paints are alkyd resin based. Some enamel paints have been made by adding varnish to oil-based paint.

1.5.5. 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

Paint Type

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.

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.

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..

Self-Check -5	**Written Test**

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

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

Match Column "A" with Column "B"

Column "A"	Column "B"
_____3/ its drying speed was enhanced	A/ Water base paints
_____4. / did not hold up to abrasions	B/ oil based paints
_____5/ used right before painting a new surface	C/ Primer paint
_____6/ used before painting a surface that has been painted in the past	D/ Undercoat paint

2. Among those different types of paints, list at list five of them.

3. What is difference between thinners and reducers

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-6	Identifying and checking hand, power tooling and safety equipment

1.6. **Identifying and checking hand, power tooling and safety equipment**

Here are some of the most important tools in an auto body shop.

- Dual-Action Sander, Spray gun, Air compressors, Spray booths, Machine buffs and polishes, Mixing equipment, Paint stirring equipment, Paint straining and thinning equipment

Spray Equipment:-

The application system required under this procedure must have these capabilities:-

- Spray wands of various lengths.
- Fan –shaped spray patterns covering 360 degree.

Safety Equipment: - Spray Safety (To prevent injury during spraying operations, wear theses protective equipment), NIOSH- (approved fume respirator or fresh-air system),
Preventive clothing, Rubber gloves, Face shield or safety glasses

Before using hand tools inspect /check for the following:

- The outside of the tool is free of grease, oil and accumulated foreign matter
- The tool has no visible cracks in jaws or handle
- Blades or bits are not damaged, cracked, etc.
- Handles are not cracked, damaged or loose from heads of hammers, axes mauls and other similar tools
- ips of screwdrivers, chisels or other similar tools show no excessive wear
- Gripping surfaces pliers, wrenches or other similar tools are not worn
- Tools such as chisels and punches do not have mushroomed heads
- Cutting tools such as chisels and axes are sharp
- Tool appears to be in generally good condition

Before using portable power tools inspect for the following:

- The outside of the tool is free of grease, oil and accumulated foreign matter
- Tool power-source shows no damage (cord, air line, battery, etc.)
- Tool is double insulated and tool housing is not damaged
- If so equipped, electrical cord third prong (ground) is intact
- All shields, guards or attachments required by OSHA or manufacturer are present
- Rotating or moving parts of tool are guarded to prevent physical contact
- Tool is not leaking fluid such as gasoline, oil etc.
- Blades or bits are not damaged, cracked, excessively worn, etc.
- Tool appears to be in generally good condition
- Proper PPE is available

Self-Check -6	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1/ Among those **most important tools in used an auto body applying paint touch up techniques , list at least 5/five of them.**

2/ Mention the capabilities that the spray equipment application system required.

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-7	Determining procedures to minimize waste material

1.7. **Determining procedures to minimize waste material**

Waste minimization revolves around R's as follows:

- Reduce. ...
- Reuse. ...
- Recycle. ...
- Optimization of resources. ...
- Scrap metal reuse. ...
- Quality control improvement and process monitoring. ...
- Exchange of Waste. ...
- Shipping to the point of use.

.

Reducing waste and preventing pollution

Auto body shops can follow a number of good ideas to go beyond compliance in managing solid waste and preventing pollution.

The following Best Management Practices (BMPs) are good ideas for reducing waste and preventing pollution. Many of these tips may also save you money, and improve your shop's efficiency and effectiveness. Especially important points covered on the self-certification form are listed in **bold**.

- **Create a "first-in, first-out" policy for product storage areas**, to prevent materials from becoming unnecessarily outdated. To do this, date all materials when they are received and when they are opened, and don't open or use a newer product before finishing an older product.
- Inspect materials upon delivery and IMMEDIATELY return unacceptable materials to the supplier. This can help avoid unnecessary cost and waste.
- Put someone in charge of distributing and tracking all supplies and raw materials.
- Reduce solid waste by laundering shop towels through an industrial laundry service that discharges its wastewater into a public sewer system.
- Keep accurate records of your material usage to know how much you are reducing.

- Delaware Department of Natural Resources and Environmental Control Auto Body Self-Certification Program
- Keep your storage and work areas clean and well organized.
- Manage, maintain and monitor your shop for top efficiency:
- Locate and repair all leaks to prevent losses.
- Practice preventive maintenance to avoid future losses from leaks.
- Keep all containers covered to prevent evaporation and spills.
- Install flow meters, flow control devices, and/or shutoff nozzles to cut down on water
  usage.
- Recycle cardboard, paper, glass, plastic and metal at a DSWA Recycling Center near you.

Self-Check -7	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List those waste materials minimizing procedures **revolves around R's**

3. Among those many number of good ideas to go beyond compliance in managing waste and preventing pollution of auto body shops mention at least 6/six of them

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet- 8	Identifying procedures to maximizing energy efficiency

1.8. **Identifying procedures to maximizing energy efficiency**

The efficiency is the energy output, divided by the energy input, and expressed as a percentage. A perfect process would have an efficiency of 100%. W_{out} = the work or energy produced by a process. Units are Joules (J).

Energy conversion efficiency (η) is the ratio between the useful output of an energy conversion machine and the input, in energy terms. The input, as well as the useful output may be chemical, electric power, mechanical work, light (radiation), or heat.

To make your manufacturing facility more energy efficient and less expensive to run, here are ways to reduce industrial energy costs on your production floor.

1. Develop an Energy Management Team. ...
2. Conduct an Energy Audit. ...
3. Strategically Schedule Machinery Use. ...
4. Schedule Shut-Downs and Start-Ups. ...
5. Optimize Air Compressors.

Ways to conserve energy

- Adjust your day-to-day behaviors. ...
- Replace your light bulbs. ...
- Use smart power strips. ...
- Install a programmable or smart thermostat. ...
- Purchase energy efficient appliances. ...
- Reduce your water heating expenses. ...
- Install energy efficient windows. ...
- Upgrade your HVAC system

Self-Check -8	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is efficiency? Define it.

2. Define energy conversion efficiency

3. What are those the 5/five ways to reduce industrial energy costs to make manufacturing facility more energy efficient and less expensive to run?

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

List of Reference Materials

- https://m.resene.co.nz whatispaint
- https://www.google.com/url-difference-between-primer-and-undercoat-paint
- https://www.thegreenbook.com.what-is-the-use-of-lacquer
- https:// www.autobodytoolmart.com.how-to-paint-a-car-
- Ref. https://www.managementstudyguide.com/job-description-specification.htm
- Automotive Mechanics, 10th edition By: Crouse/ Anglin
- Modern Automotive Technology By: James E. Duffy
- Manufacturer's Manual Toyota Corporation
- www.legislation.qld.gov.au
- www.safety .uwa. edu.au > topic > protective-equipment
- https://www.bramptonguardian.com
- https://www.medium.com
- www.mhi.org . fundamentals > material-handling
- https://www.quora.com > What-are-the-main-aims-and-objectives-of-first-aid
- https://m.resene.co.nz whatispaint.
- https://www.hunker.com what-is-vinyl-paint
- https://www.google.com/url-difference-between-primer-and-undercoat-paint
- https://www.thegreenbook.com.what-is-the-use-of-lacquer
- https://www.google.com/url? differences-thinner-reducer-automotive-paint-
- https://www. conserve-energy-future.com what-is-the-process-of-minimizing-waste
- https:// www.sageautomation.com basic-energy-saving-tips-for-manufacturers

VEHICLE BODY REPAIRING AND PAINTING

Level II

Learning Guide # 41

Unit of Competence: - Apply Paint Touch-up Techniques

Module Title: Applying Paint Touch-up Techniques

LG Code: EIS VRP2 M12 LO2-LG-41

TTLM Code: EIS VRP2 TTLM 0919 v1

LO 2: Prepare equipment

Instruction Sheet	Learning Guide # 41

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

- Accessing and interpreting Information.
- Carrying out preparation

This guide will also assist you to attain the learning outcome stated in the cover page.
Specifically, upon completion of this Learning Guide, **you will be able to –**

- Accessing and interpreting Information from manufacturer/ component supplier specifications.
- Carrying out preparation according to industry regulations/guidelines, WHS requirements, legislation and enterprise procedures/policie.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number **3 to 14.**
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1” **in page 44**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.
8. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
9. Accomplish the “Self-check 2” **in page 50**

10. Ask from your **teacher the key to** correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 2).
11. If you earned a satisfactory evaluation proceed to “Operation Sheet 1” in **page 51**. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
12. Read the “Operation Sheet 1” and try to understand the procedures discussed.
13. If you earned a satisfactory evaluation proceed to “Operation Sheet 2” **in page 52**. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
14. Read the “Operation Sheet 2” and try to understand the procedures discussed..

Do the “LAP test” **in page 53** (if you are ready). Request your teacher to evaluate your performance and outputs. Your teacher will give you feedback and the evaluation will be either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work.

Information Sheet-1	Accessing and interpreting information.

2.1. Accessing and interpreting information

Spray painting equipment for the auto refinishing shop consists of:

- Spray guns and cups (either suction or pressure feed)
- Air compressor of adequate size
- Oil and water extractor and air regulator combination to filer air and regulate pressure
- Air hose of sufficient size(inside diameter) to convey air from the regulator to the spray gun without causing an excessive drop in pressure
- Spray booth or enclosure to ensure a healthy, safe, dust free working area.

SPRAY GUN

An air spray gun can be defined as a tool that turns a liquid in to tiny droplets by means of air pressure. This process is called atomization.

PRINCIPAL PARTS OF SPRAY GUN

The principal parts or components of a typical air spray gun are illustrated in Figure below.. Some guns are equipped with a removal spray head unit containing the air cap, fluid tip, and fluid needle.

- Air cap or nozzle
- Fluid tip or nozzle
- Fluid needle valve
- Trigger
- Fluid control (or spreader) knob
- Air valve
- Pattern (or fan adjustment)control knob
- Gun body (or handle

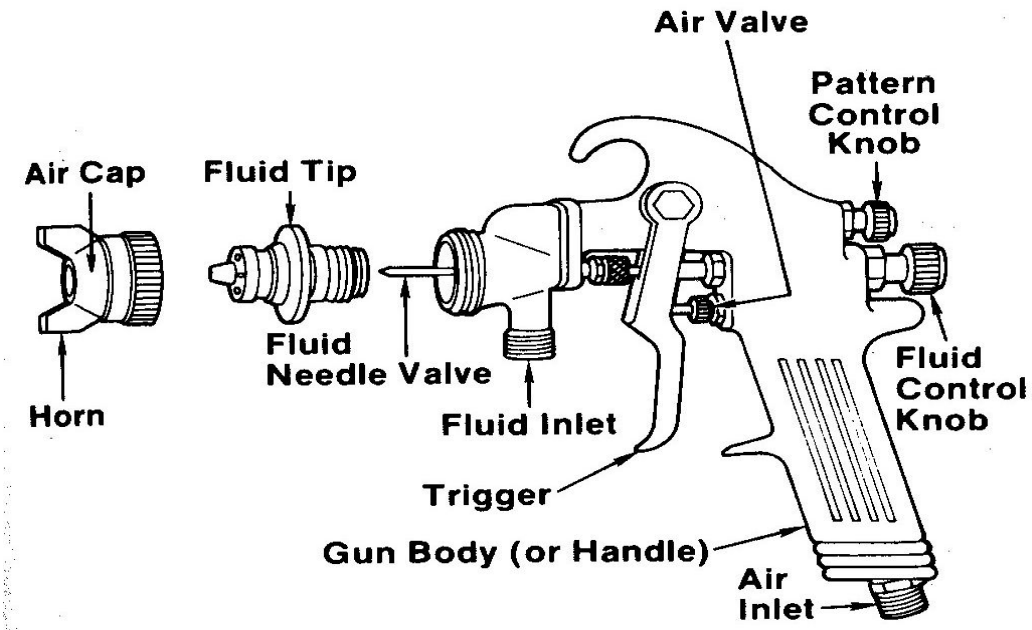


FIGURE 18-4 Study parts of a typical air spray gun.

TYPES OF AIR SPRAY GUNS

As pointed out in table there are three basic methods of paint supply or feed to the air spray gun

4. Suction (or siphon) feed type

The suction feed type air spray gun is by far the most used type in auto paint shops. The paint material is held in a 1-quart (0.94liter) cup attached to the gun.

The suction feed gun is by far the most popular type of gun in auto refinishing shapes for all types of work (spot, panel and overall).

a. Compression feed type (Figure

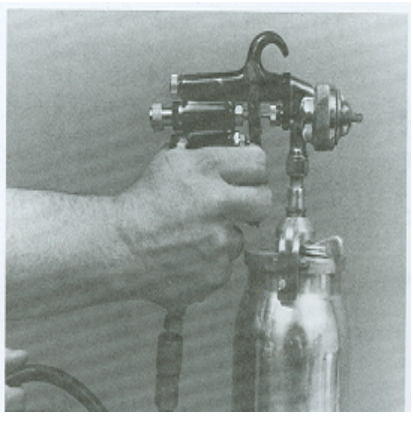
The pressure feed gun is mainly used for overall painting of vehicles (including trucks and vans), for spraying some heavier refinishing material that are too heavy to be siphoned from a container, or where volume painting is required..

b. Gravity feed type

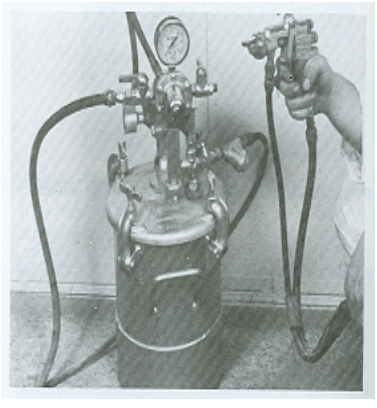
In the gravity feed system, the paint is supplied by gravity and the material is suction forced at the nozzle tip. This system is ideal for heavier material such as lightweight body filler. The handling of the gun is the same as suction feed type gun.

Table T YPES OF AIR SPRAY GUNS

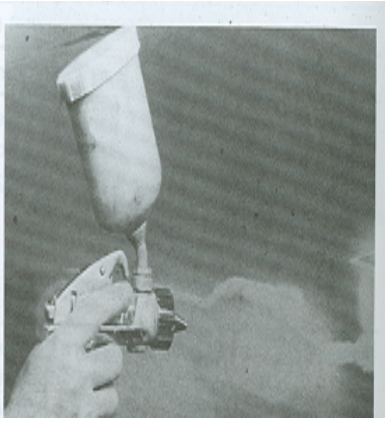
TYPE	PAINT FEED METHOD	ADVANTAGES	DISADVANTAGES
Suction feed type	Paint container is installed below the spray nozzle and paint is supplied by suction force alone	Stable gun operation, Easy to refill container or make color changes	Difficult to spray on horizontal surfaces and some variations occur in discharge volume due to variations in viscosity. Has a larger paint container than gravity feed type but this causes quicker painter fatigue.
Pressure type	Paint is pressurized by a compressed air taken or pump	Large surface can be paint without stopping to refill container or make color changes	Not suitable for small area painting. Color changes and gun cleaning take time
Gravity feed type	As the paint cup is installed above the spray nozzle, paint is supplied by gravity and a suction force at the nozzle yip.	Because there is no change in paint viscosity, there is no variation in the injection volume. The position of the cut can be changed according to the configuration of the painted item	Because the cup is installed above the injection nozzle, it adversely affects gun stability. Cup capacity is small so not useful for painting larger surface



Suction feed type spray gun



Pressure feed type spray gun



Gravity feed type spray gun

High Volume Low Pressure (HVLP) Spray Gun

Item Description

Here we are offering a Professional 7-Piece HVLP Spray Gun Kit. Kit contains 1.8mm; 1.4mm and 1.0mm spray guns will allow you to spray a wide spectrum of coatings! This spray gun kit supplies low pressure through the air cap which makes the spraying softer, easily controlled and less overspray in high transfer efficiency.Ideals for basecoats, clear coats, single stages and primers.

Features:

a. Designed to provide equal atomization and particle size for all kinds of surface painting.
b. Light weight, ergonomic design and easy trigger pivot reduces operating fatigue.
c. Stainless steel nozzle and needle to allow use aqueous based paint for long time
d. Precise 1.8mm, 1.4mm& 1.0mm stainless steel needle and nozzle set.
e. 3 Knobs for full adjustment: fluid, pattern and air pressure controls.
f. Two 1000ml and one 100ml aluminum cups with lids
g. A aluminum carrying case w/ locks for easily taking with
h. Comes with a air regulator with gauge as free gift

Applicants:

- 1.8mm set-up is ideal for the atomization of primers, sealers, thinned latex/oil base, and other medium to heavy viscosity coatings.
- This 1.4mm set-up for spraying basecoats, clear coats, single stage and other light to medium viscosity coatings.
- 1.0mm spray gun used for tight areas, small jobs and touch up

Specifications:

Spray Gun	Full Size Spray Guns		Mini Size Spray Gun
Nozzle Size	1.8 mm	1.4 mm	1.0 mm
Air Inlet	1/4"		
Type of Feed	Gravity		
Recommended Air Pressure	0-43 psi (0-2.9 bar)		0-30 psi (0-2 bar)
Max. Pressure of Air	43 psi (2.9 bar)		30 psi (2 bar)
Paint Capacity	1000 ml		100 ml
Average Air Consumption	5-10 cfm		1-4 cfm
Pattern Width	6.3"-9.4" (160-240mm)		3.1"-3.9" (80-100 mm)
Operating Pressure	87 - 116 psi		

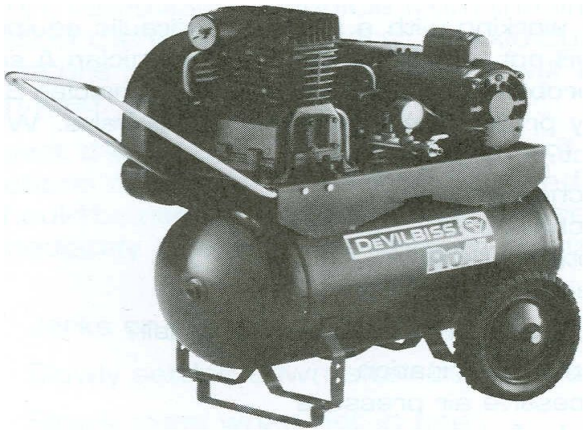
Air Spray Gun Kit aluminum

Two 1000ml and one 100ml cups with lids air regulator with gauge

Compressed Air Supply Equipment

The **compressed air supply system** is designed to provide an adequate supply of clean, dry air at a predetermined pressure to insure efficient operation of all pneumatic equipment in the body shop. The system can vary in size from small portable units to large in-shop installations

An air compressor sometimes referred to as an air pump, can be one compressor or a series of compressors. The compressor is the "heart" of the system. The power source is generally an electric motor. (Portable gasoline-driven compressors are available for work outside the shop.)



A portable piston compressor mounted on. Wheels may be adequate for small jobs and one air tool

COMPRESSOR-TYPES

There are three basic types of air compressors: the diaphragm type, the piston type, and the rotary screw type

Diaphragm-Type Compressor

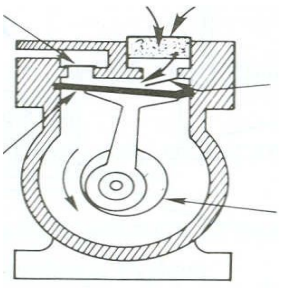
The *diaphragm-type compressor* uses a flexible synthetic rubber membrane to produce a pumping action. This type of compressor is often used on very small compressors to power small air brushes

Piston-Type Compressor

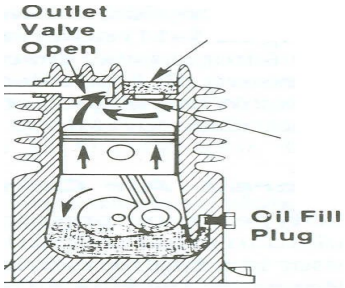
The *piston-type air compressor* pump develops compressed air pressure through the action of a reciprocating piston. Piston compressor pumps are available in single' or multiple cylinder and single- or two-stage models. Selection depends on the volume and pressure required.

Rotary Screw Air Compressor

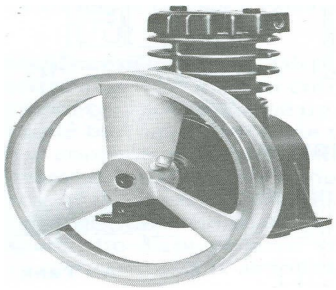
Rotary screw-type air compressors have been a standard in other industries. The rotary screw air compressor is a highly efficient and dependable machine. However, because of an oil output problem, this type was never accepted by the automotive refinishing profession.



Diaphragm type



Piston type



Rotary screw type

Air pressure regulators

Pressure regulators are valves that automatically cut off the flow of a gas or liquid when it is at a certain **pressure**. **Regulators** are also used to allow high-**pressure** fluid supply tanks or lines to be reduced to a usable and safe **pressure** for different applications.

Devil Biss DVFR-2 Filter Regulator, Coalescer

The main function of **pressure regulator** is to match the flow of gas through the regulator to the demand for gas placed upon it, whilst maintaining a constant output pressure. If the load flow decreases, then the regulator flow must decrease also. If the load flow increases, then the regulator flow must increase in order to keep the controlled pressure from decreasing due to a shortage of gas in the pressure system.

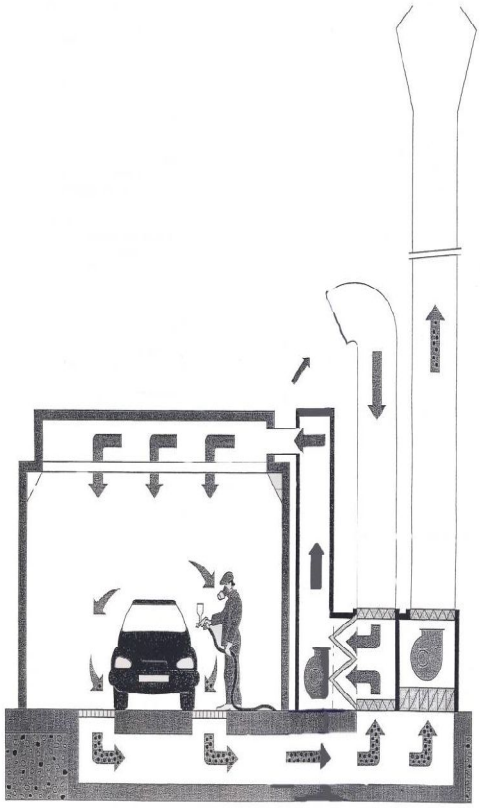
Spray booths

A compartment, room or enclosure, of fireproof construction such metal, built to confine and exhaust the overspray and fumes resulting from spray finishing.

Intake filters are used to clean dirt and contaminants from the air entering the **paint booth's** chamber. They're located in the ceiling of a downdraft **paint booth** and in or near the doors of a cross draft **booth**..

Benefits of a spray booth?

A well designed and maintained spray booth will provide a number of advantages. It will segregate the spraying operation from other activities, making both the spraying and other operations cleaner and safer. It reduces fire and health hazards by containing the Overspray and fumes. It provides an area which is easier to keep clean, which means both the operator and the object being sprayed are likely to stay cleaner



Spray Booths

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define the following

   A. Air pressure regulators

   B. Air spray gun

   C. Spray booth

2. Mention the three types of spray gun

   A/ ----------

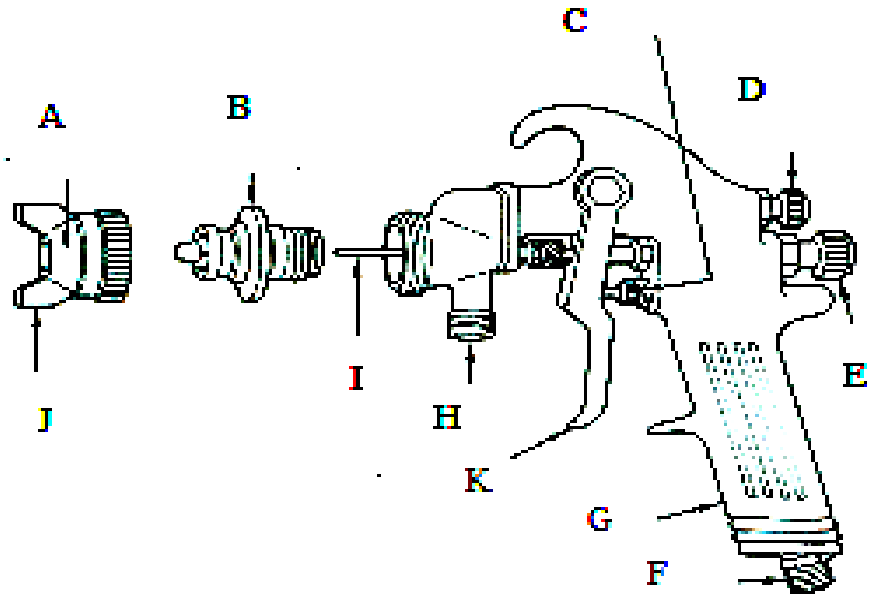
   B/ ----------

   C/ ----------

Match Column “A” with Column “B”

Column “A”	Column “B”
----------3/ Often used on very small compressors to power small air brushes	A/ *piston-type air compressor*
----------4/ Develops compressed air pressure through the action of a reciprocating piston	B/ *diaphragm-type compressor*
----------5/ Compressors not accepted by the. automotive refinishing profession	C/ Rotary screw-type air compressors

6/ Identify the component parts of a spray gun from the figure below



A._____

B._____ G._____

C._____ H_____

D._____ I._____

E._____ J._____

F._____ K._____

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-2	Carrying out Preparation

2.2. Carrying out Preparation

Spray Gun and Related Equipment Operation

Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment).

Check and adjust spray gun operation for HVLP (High Volume, Low Pressure) or LVLP (Low Volume, Low Pressure) guns.

Set up (fluid needle, nozzle, and cap), adjust, and test spray gun using fluid, air, and pattern control valves

The equipment is hooked up for operation as follow:

- Connect airline from the compressor outlet to the air control device or regulator inlet.
- Connect air hose leading from the air outlet on the air control device to the air inlet on the spray gun
- After the material has been reduced to proper consistency, thoroughly mixed, and strained into the cup, attach the gun to the cup

Spray guns fine Adjustment:

The desired pattern and fine atomization can be easily obtained by regulating the Pattern Adjusting Knob and Fluid Adjusting Knob.

- **Pattern Adjustment:** Turn the Pattern Adjusting Knob to the right until tight will make spray pattern round, or turn left make spray pattern ellipse.
- **Fluid Adjustment:** Turn the Fluid Adjusting Knob clockwise will decrease the volume
- **+-**fluid output and counter-clockwise will increase fluid output.

Package Content:

- 1x 1.8mm HVLP primer spray gun
- 1x 1.4mm HVLP topcoat spray gun
- 1x 1.0mm HVLP touch-up spray gun
- 2x 1000ml aluminum cups w/ lids
- 1x 100ml aluminum cup w/ lid
- 1x Locking air pressure regulator w/ gauge

- 1x Aluminum carrying box
- 1x Instruction manual

❖ HVLP (High Volume, Low Pressure)

1x 1.8mm HVLP HVLP spray gun

1x 1.4mm HVLP primer spray touch- up spray gun

1x 1.0mm topcoat

Preparing Regulator

INSTALLATION

1. Install unit vertically in air line -
   - upstream of lubricators and cycling valves,
   - with air flow in direction of arrow on body,
   - as close as possible to the device being serviced.
2. Before assembling the basic unit into the yoke the port seal o-rings should be lightly smeared with o-ring grease.
3. Locate clamp ring under lugs on top of yoke, offer basic unit into yoke with directional arrows correctly aligned (an interference fit prevents assembly if misaligned) before engaging and fully tightening the clamp ring.
4. Turn bowl or bowl guard fully clockwise into body before pressurizing. Lock symbols on body and bowl guards must align.
5. Install a pressure gauge or plug the gauge ports. Gauge ports can also be used as additional outlets for regulated air.
6. Auto-drain units may be fitted with a short drain pipe and connector, minimum 5 mm bore, to the G1⁄8 bottom outlet.

ADJUSTMENT

1. Before applying inlet pressure to filter/regulator, turn adjustment (1 or 6) counterclockwise to remove all force on regulating spring
2. Apply inlet pressure, then turn adjustment (1 or 6) clockwise to increase and counterclockwise to decrease pressure setting.
3. Always approach the desired pressure from a lower pressure. When reducing from a higher to a lower setting, first reduce to some pressure less than that desired, then bring up to the desired pressure.

NOTE

With non-relieving filter/regulators, make pressure reductions with some air flow in the system. If made under no flow (dead-end) conditions, the filter/regulator will trap the over-pressure in the downstream line.

4. KNOB ADJUSTMENT. Push knob down to lock pressure setting. Pull knob up to release.

Install tamper resistant cover (see Replacement Items) to make setting tamper resistant.

5. T-BAR ADJUSTMENT. Tighten lock nut (8) to lock pressure setting

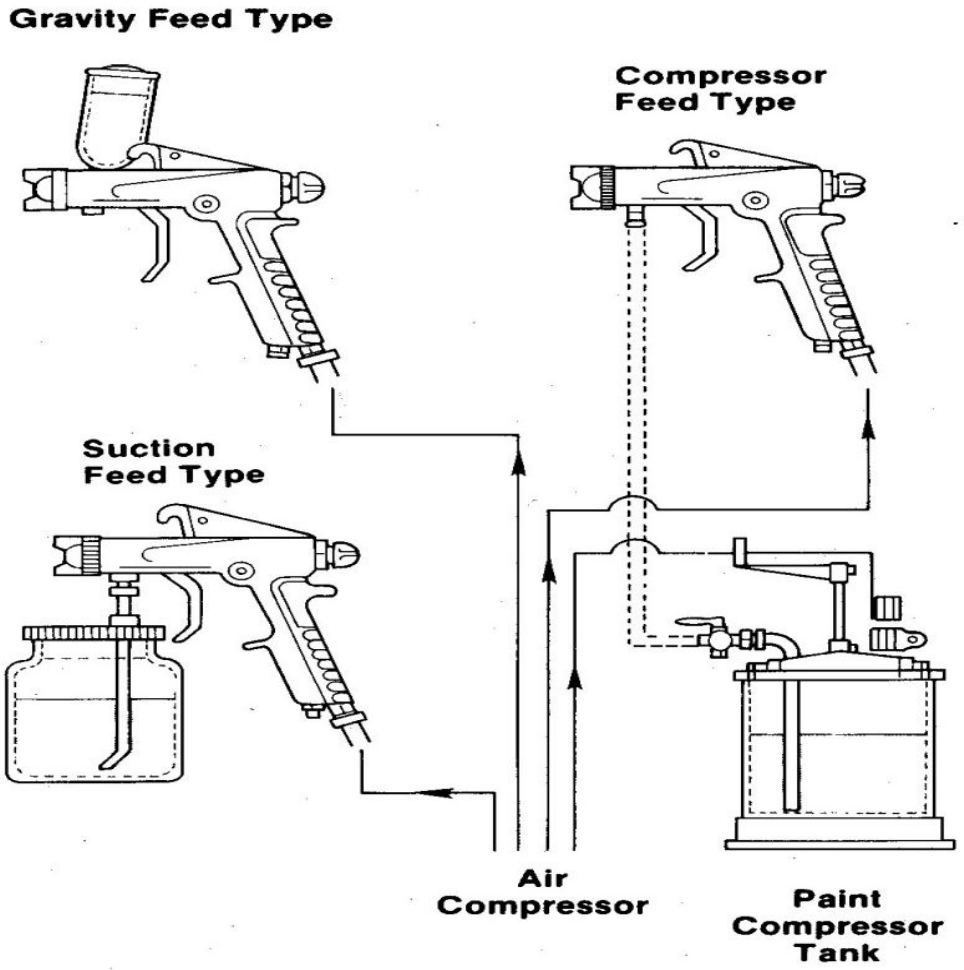


FIGURE 18–7 Study paint feed methods to air spray guns.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Match Column "A" with Column "B"

Column "A"	Column "B"
----------1/ Turning the spray gun fluid adjusting Knob clockwise	A/ Makes spray pattern round
----------2/ Turning the spray gun pattern adjusting Knob to the right	B/ Decrease the volume
----------3/ Turning the spray gun fluid adjusting Knob counter clockwise	C/ primer spray
----------4/ 1x 1.8mm HVLP	D/ touch- up spray gun
----------5/ 1x 1.4mm HVLP	E/ Increase the volume
---------- 6/ 1x 1.0mm HVLP	F/ topcoat spray gun

7/ Describe the abbreviations HVLP(gun) stands for:-

8/ Describe the abbreviations LVLP(gun) stands for :-

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet 1	Spray gun and related equipment preparation for operation

Procedures of pray gun and related equipment preparation for operation

Steps:-

1. Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, air lines, air source, and spray environment).
2. Check and adjust spray gun operation for HVLP (High Volume, Low Pressure) or LVLP (Low Volume, Low Pressure) guns.
3. Set up (fluid needle, nozzle, and cap), adjust, and test spray gun using fluid, air, and pattern control valves
4. Connect airline from the compressor outlet to the air control device or regulator inlet.
5. Connect air hose leading from the air outlet on the air control device to the air inlet on the spray gun
6. After the material has been reduced to proper consistency, thoroughly mixed, and strained into the cup, attach the gun to the cup
7. **Adjust Pattern:** Turning the Pattern Adjusting Knob to the right until tight will make spray pattern round, or turn left make spray pattern ellipse.
8. **Adjust Fluid :** Turning the Fluid Adjusting Knob clockwise will decrease the volume **and** counter-clockwise will increase fluid output

.

Operation Sheet 2	Preparing air pressure regulator

Procedures for preparing air pressure regulator

Steps:-

INSTALLATION

Steps:-

1. Install unit vertically in air line -.
2. Before assembling the basic unit into the yoke the port seal o-rings should be lightly smeared with o-ring grease.
3. Locate clamp ring under lugs on top of yoke, offer basic unit into yoke with directional arrows correctly aligned (an interference fit prevents assembly if misaligned) before engaging and fully tightening the clamp ring.
4. Turn bowl or bowl guard fully clockwise into body before pressurizing. Lock symbols on body and bowl guards must align.
5. Install a pressure gauge or plug the gauge ports. Gauge ports can also be used as additional outlets for regulated air.
6. Auto-drain units may be fitted with a short drain pipe and connector, minimum 5 mm bore, to the G1⁄8 bottom outlet.

ADJUSTMENT

7. Before applying inlet pressure to filter/regulator, turn adjustment (1 or 6) counterclockwise to remove all force on regulating spring
8. Apply inlet pressure, then turn adjustment (1 or 6) clockwise to increase and counter clockwise to decrease pressure setting.
9. Always approach the desired pressure from a lower pressure. When reducing from a higher to a lower setting, first reduce to some pressure less than that desired, then bring up to the desired pressure.
10. ADJUST KNOB. Push knob down to lock pressure setting. Pull knob up to release. Install tamper resistant cover (see Replacement Items) to make setting tamper resistant.
11. ADJUST T-BAR. Tighten lock nut (8) to lock pressure setting

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 4:00hour.

Task 1. Prepare spray gun and related equipment for operation

Task 2. **Prepare air pressure regulator**

List of Reference Materials

- **https://www.how-pressure-regulators-work**
- www.paint-booths.com paint-booth-air-
- Automotive Mechanics, 10th edition By: Crouse/ Anglin
- Modern Automotive Technology By: James E. Duffy
- Manufacturer's Manual Toyota Corporation

VEHICLE BODY REPAIRING AND PAINTING

Level II

Learning Guide # 42

Unit of Competence: - Apply Paint Touch-up Techniques

Module Title: Applying Paint Touch-up Techniques

LG Code: EIS VRP2 M07 LO3-LG-42

TTLM Code: EIS VRP2 TTLM 0919 v1

LO 3: Prepare and apply materials

Instruction Sheet	Learning Guide # 42

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

- Accessing and interpreting **information**
- Carrying out preparation and ***application*** of materials

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Accessing and interpreting **information** from manufacturer/ component supplier specifications.
- Carrying out preparation and ***application*** of materials in accordance with manufacturer/component supplier specifications.
- Carrying out preparation and ***application*** of materials according to industry regulations/guidelines, WHS requirements, legislation and enterprise procedures/ policies.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number **3 to 17.**
   Read the information written in the "Information Sheets 1". Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
3. Accomplish the "Self-check 1" **in page 63.**
4. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
5. If you earned a satisfactory evaluation proceed to "Information Sheet 2". However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
6. Submit your accomplished Self-check. This will form part of your training portfolio.

7. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
8. Accomplish the “Self-check 2” **in page 80.**
9. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 2).
10. If you earned a satisfactory evaluation proceed to “Operation Sheet 1” **in page 81**. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
11. Read the “Operation Sheet 1” and try to understand the procedures discussed.
12. If you earned a satisfactory evaluation proceed to “Operation Sheet 2” **in page 82**. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
13. Read the “Operation Sheet 2” and try to understand the procedures discussed.
14. If you earned a satisfactory evaluation proceed to “Operation Sheet 3” in page 83 However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
15. Read the “Operation Sheet 3” and try to understand the procedures discussed.
16. If you earned a satisfactory evaluation proceed to “Operation Sheet 4” in page 84 However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
17. Read the “Operation Sheet 4” and try to understand the procedures discussed

Do the “LAP test” **in page 85** (if you are ready). Request your teacher to evaluate your performance and outputs. Your teacher will give you feedback and the evaluation will be either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work.

Information Sheet-1	Accessing and interpreting information

3.1. Accessing and interpreting information

3.1.1. Verbal or written and graphical instructions,

Includes:-

Lectures, Handouts, Team teaching, peer teaching, Discussion – individual, group and peer

question and answer, Multimedia, Seminars, Case studies, Project/assignments

According to ASE/NATEF standards, the automobile technician must be proficient in the following Language Arts and Communications related academic skills that are embedded in the occupation.

The activities and information presented to the following standards the National Institute for Automotive Service Excellence

- Request, collect, comprehend, evaluate, and apply oral and written information gathered from customers, associates, and supervisors regarding problem symptoms and potential solutions to problems.
- Identify the purpose for all written and oral communication and then choose the most effective strategies for listening, reading, speaking, and writing to facilitate the communication process.
- Adapt a reading strategy for all written materials, e.g. customer's notes, service manuals, shop manuals, technical bulletins, etc., relevant to problem identification, diagnosis, solution, and repair.
- Use study habits and techniques,
- Follow all oral/written directions that relate to the task or system under study.
- Comprehend and apply industry definitions and specifications.
- Use the service manual to identify the manufacturer's specifications for system parameters,
- Supply clarifying information to customers, associates, parts supplier, and supervisors

3.1.2. Material safety data sheets (MSDS)

A material safety data sheet is a technical document which provides detailed and comprehensive information on a controlled product related to:

- Health effects of exposure to the product
- Hazard evaluation related to the product's handling, storage or use
- Measure to protect workers at risk of exposure
- Emergency procedures.

The data sheet may be written, printed or otherwise expressed, and must meet the availability, design and content requirements of WHMIS legislation. The legislation provides for flexibility of design and wording but requires that a minimum number of categories of information be completed and that all hazardous ingredients meeting certain criteria be listed subject to exemptions granted under the Hazardous Materials Information Review Act.

The Purpose of the Data Sheet

The data sheet is the second element of the WHMIS information delivery system and is intended to supplement the alert information provided on labels. The third element of the system is the education of employees in hazard information on controlled products, including instruction in the content and significance of information on the MSDS.

Responsibilities Related to the MSDS Suppliers

1. Develop or obtain a MSDS for each controlled product imported or sold for use in a workplace
2. Ensure the MSDS for the controlled product:
    - Discloses information that is current at the time of sale or importation of the product
    - Was prepared and dated not more than three years before the date of sale or importation
    - Is available in both official languages
3. Ensure the purchaser of the controlled product has a copy of the current MSDS at the time of or prior to the purchaser receiving the controlled product
4. Make available any information that is considered confidential (trade secret) information

and therefore exempt from disclosure to any physician or nurse who requests that information for the purpose or making a medical diagnosis or providing medical treatment

3.1.3. Regulatory/legislative requirements

- Provision and Use of Work Equipment Regulations 1992.
- . Power Presses Regulations 1992.
- Pressure Systems and Transportable Gas Containers Regulations 1989.
- Electricity at Work Regulations 1989.
- Noise at Work Regulations 1989.
- Manual Handling Operations Regulations 1992.
- Health and Safety (Display Screen Equipment) Regulations 1992.
- Abrasive Wheel Regulations
- .Safe Working Loads.
- Working at Height Regulations (date)

3.1.4. Engineer's design specifications and instructions

Value Engineering in Design (VE Studies)

It is best to perform VE during the early phases of design. Starting the VE study at the 30 percent design stage is highly recommended. The VE team is a group of multi-disciplined individuals who are not directly involved in the design of the project.

Their objective is to ensure that transportation safety, District long-range comprehensive plans, and the communities' needs are met in an efficient and cost-effective way. VE studies culminate in a formal report outlining the study team's recommendations.

VE (Value Engineering) studies should incorporate seven characteristics:

1. A multi-disciplinary team approach
2. The systematic application of a recognized technique (VE Job Plan)
3. The identification and evaluation of function, cost and worth
4. Creative speculation on alternatives that can serve the required functions (search for solutions from new and unusual sources)
5. Evaluation of the best alternatives with the lowest life-cycle costs
6. Development of acceptable alternatives into fully supported recommendations

7. The presentation/formal reporting of all VE recommendations to management for review, approval and implementation

Design Team Structure

The Design Consultant must provide a staffing plan that identifies and documents project roles, responsibilities, required skills and reporting relationships for all key professionals assigned to the project. These key professionals must be the same as those proposed by the Consultant at the time of contract award unless otherwise approved by the DDOT Project Manager.

Design Team Structure Deliverables

- Staffing plan identifying key personnel by title, role and responsibility
- Resumes of key personnel
- Organizational chart showing reporting relationships of all key personnel
- Point of contact

Risk Management

Risk management is critical to the success of the project development process and needs to be integrated into the Consultant's project management plan. Effective risk management occurs

3.1.5. Organisation work specifications and requirements

Here are five steps you can follow to write an effective SRS document.

1. Create an Outline (Or Use an SRS Template) your first step is to create an outline for your software requirements specification. ...
2. Start With a Purpose. ...
3. Give an Overview of What You'll Build. ...
4. Detail Your Specific Requirements. ...
5. Get Approval for the SRS.

3.1.6. International standards

The International Organization for Standardization (**ISO** /ˈaɪsoʊ/) is an international **standard**-setting body composed of representatives from various national **standards** organizations. Founded on 23 February 1947, **the** organization promotes worldwide proprietary, industrial and commercial **standards**.

The ISAs are divided into 36 different **standards**, all grouped into six categories—General Principles, Risk Assessment and Response, Audit Evidence, Using the Works of Others, Conclusions and Reporting, and Specialized Areas. The sum total of these things is a 961-page handbook

There are various **types of ISO certification** are available such as listed below: **ISO** 9001:2008- Quality Management System. OHSAS 18001 – Occupational Health & Safety Management System. ... **ISO** 27001 – Information Security Management System.

Many people think **ISO** stands for something, that it's an acronym for the developer and publisher of International Standards — the International Standards Organization. But that **ISO** organization is actually called International Organization for Standardization or IOS. ... The **ISO** standards **are** not named after an acronym

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. A material safety data sheet(MSDS) is a technical document which provides detailed and comprehensive information on a controlled product related to:
   A/ Health effects of exposure to the product
   B/ Hazard evaluation related to the product's handling, storage or use
   C/ Measure to protect workers at risk of exposure
   D/ Emergency procedures E/ All are the correct answers

2. ---------- is an international **standard**-setting body composed of representatives from various national **standards** organizations

3. Write the three types of **ISO certification**

   A/ ----------
   B/ ----------
   C/ ----------

4. Describe what an acronym **ISO** stands for:-

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-2	Carrying out preparation and ***application*** of materials,

3.2. Carrying out preparation and ***application*** of materials

Surface preparation

Cleaning and Sanding the Surface

Wash the car. 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

a. **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

b. **Apply a wax and grease remover to the area being fixed**.

It's important to remove any wax on areas that need to have paint adhere to them. Wax isn't typically removed by soap and water, so a specific remover is needed. Wax removers are available at most auto parts stores. These rust removal products are made specifically for removing rust on the bodies of cars.

c. **Sand the area to prep the surface.**

Use a small piece of sandpaper to sand all around the scratch. Try to remove all loose paint from the area while you sand. This process will also give the touch-up paint a clean surface to stick to.

Tip: Sand the area with 220-grit sandpaper. This will allow the primer to stick

Fig: 1. Cleaning and Sanding the Surface any you find

Fig: 2. Check for rust and remove

Fig:3. Apply a wax and grease remover to the area being fixed

Fig:4. Sand the area to prep the surface

Fig: 5. Wash and dry

Priming and Painting Chipped Areas

1. **Figure out the exact paint color on your car.**
   If your car has its original paint job, you can do an online search for your car's make, model, color, and the words "paint code." You can also look on the car for the code if you can't find it online. Check the door jam, near the VIN number, and on firewall (bulkhead) to find the paint code number

Note: The firewall is the piece of sheet metal that separates the engine under the hood from the passengers inside the vehicle. You will need to open your hood to find this number.

2. **Buy a matching touch-up paint color.**
   Go to your local auto parts store or contact your car dealership with your paint color in hand. If you have a common car, they will likely have touch up paint for your paint job in stock. If you have an unusual or rare car, they may have to order your touch up paint.
   - Touch up paint comes in several types of containers. It often comes in small jars of the paint or in paint pens.
   - It's important to get an exact match to your car's color, so don't settle on a color that is just close to your car's.
   - Light-colored cars can be difficult to find a perfect color match. Consult an auto paint specialist if you are having difficulty finding the right color
3. **Apply rust arrestor on the chipped area.**
   Before touching the chipped area up, it’s important to prevent rust from spreading underneath your touch-up job in the future. Paint on a small amount of rust inhibitor over the chipped area before the primer

Note: Rust arrestor is available at most auto parts stores. Make sure the one you use states on the package that it can be used under paint

4. **Apply primer, if necessary.**
   Squeeze a dab of primer onto the area if the chip reaches metal. If the chip is surface-level, you can skip this step. Primer is needed for deep chips because regular paint will not adhere to bare metal.
   - Spread the primer around the small chip with a tiny brush. Only use enough primer for one thin coat.
   - Allow the primer to dry completely.

- Avoid getting primer on the car paint outside of the chipped area. It will ruin the finish.

5. **Test the paint.**
   Apply some of the paint to an area on the car that isn't visible, such as the lip under a door. It is important to make sure the paint you've purchased will not react poorly to your existing paint and also that it matches well.

Tip: Shake the paint well before testing it. This will ensure that the true color and consistency are tested.

6. **Apply the touch-up paint to the primed area.**
   Spread 2 to 3 layers of touch-up paint on the area. The touched-up spot will look elevated above the rest of the paint, which is . how it should look.

- If the paint chip is on a vertical surface on your car, it's especially important to wait until the touch-up paint dries between layers so it doesn't run.

The painted area should be raised so that it can be sanded down smooth with the rest of the paint job once it is dry.

7. **Allow drying time between coats and after the layers are applied.**
   Between each layer let the paint dry for an hour. This will ensure that each layer is set and doesn't get smeared by the next. Also, wait at least 24 hours before continuing the process after you have applied all your layers

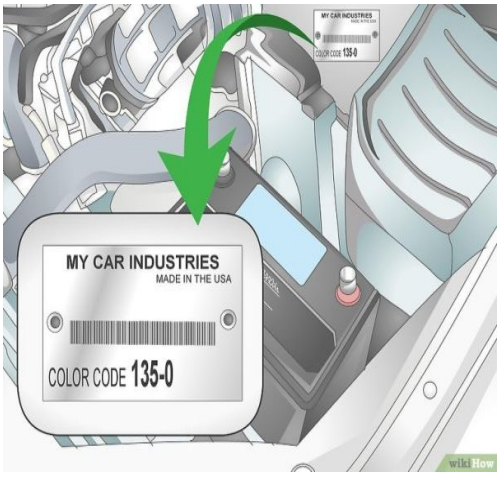


Fig: 1. Figure out the exact paint color on your car

Fig: 2. Buy a matching touch-up paint color

Fig : 3. Apply rust arrestor on the chipped area

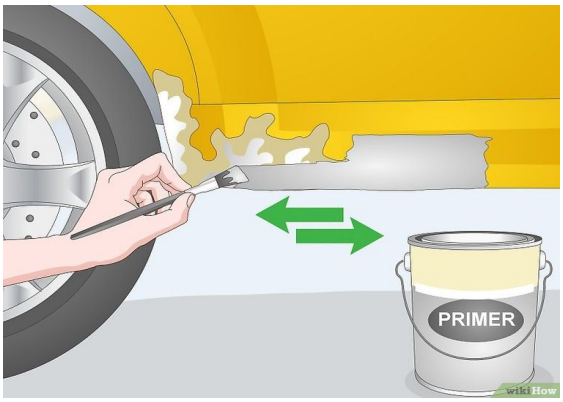


Fig : 4. Apply primer, if necessary

Fig: 5. Test the paint primed area

Fig: 6. Apply the touch-up paint to the

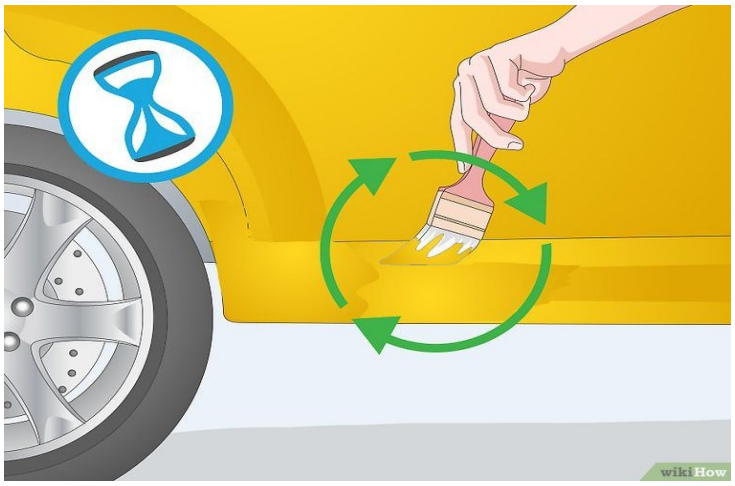


Fig: 7. Allow drying time between coats and after the layers are applied

Finishing the Surface

1. **Sand the touched-up area until it is smooth.**

   Start by sanding the area with 1000-grit sandpaper, making sure to move very slowly and gently. Once the touched-up area appears close to level with the rest of the pain, continue to sand gently with 2000-grit sandpaper. After that, rub the area with 3000-grit sandpaper until the touch-up paint is even with the rest of the vehicle.

   - As your sandpaper gets finer, it will remove less and less of the paint. Don't be tempted to push really hard with the sandpaper because of this.
   - It is ok if you sand a small amount of the surrounding painted area. This will be fixed by the top coat you will apply over the whole area.

2. **Apply the top coat.**

   Paint the top coat over the entire area that is discolored. Typically this includes the chipped area and the existing paint surrounding it that has been lightly sanded. Try to get the top coat as smooth and even as possible, using a clean brush, even strokes, as several thin layers

   - Allow your top coat to dry for 10 to 20 minutes between coats.
   - It's best to apply several thin coats instead of one thick coat.
   - Follow the directions that came on your top-coat container. In some cases they will tell you to apply several coats and in others the directions will state that one coat is enough.

3. **Sand the area once more with 3000-grit sandpaper.**

   Giving the surface one last sanding will ensure that the clear coat you applied is smooth and blended with the existing top coat. Sand it until the repaired area is flush with the rest of the paint surface on the car

Note: At this point the chipped area should disappear into the rest of the paint job.

4. **Polish and wax the entire car.**

   Once you have repaired your paint chips it's nice to give your whole car a bit of care. Polishing and waxing the car will help the repaired area blend in with the rest of the paint job and it will protect the fixed area from more damage.[13]

5. **Sand the touched-up area until it is smooth**

2. Apply the top coat

Sand the area once more with 3000-grit sandpaper

Polish and wax the entire car

3.2.1. Paint mixing procedures

Most paints have to be mixed with a reducer, thinner or hardener so they attain the right viscosity. If the paint is too thin, it will run and show lines. On the other hand if it is too thick, it won't flow out easily from the spray gun. Refer to the technical data sheets for the product you purchase and then mix the paint

One of the most important techniques used to get a paint job done properly is correct mixing of the paint. Follow the instructions listed on the paint package and use a paint mixing pail to help you attain the right viscosity. You may have to use a particular brand of thinner or reducer if required. Paint that's too thin will run lines, while paint that's too thick won't flow out easily from the spray gun.

1. Using the paint formula on the screen, select the paint toners needed to mix the desired paint color. Line the toner bottles up in order as listed in the formula.
2. Turn on the paint scale. Hold the CAL (calibration) button until the screen reads "500.0". Release the CAL button and the scale will stay at 500. Now, gently place the 500-gram weight on the scale. If the scale reads "500.0" it is properly calibrated. If it does not read "500.0", then hold the CAL button again until the screen reads "500.0" .
3. Place a 1/4 ounce mixing cup on the scale. Press the TARE button. The scale should read "0.00" with the cup in place. Now you are ready to mix the paint.
4. Open the first bottle of paint toner listed in the formula and pour the paint toner carefully by drops until it reaches the first weight measurement shown. (One drop equals approximately .03 grams.) For the Ford example, pour the first paint toner until the scale reads "2.71" grams.
5. Close the bottle, wipe the lid clean, and put the paint toner bottle away.
6. DO NOT CLEAR THE SCALE. Open the second bottle of paint toner and drop the toner into the mixing cup until you reach the next weight measurement listed. Close this bottle, clean it and put it away. For the Ford example, the scale should now read "3.85" grams.
7. Continue to add paint toner to the mixing cup for the rest of the measurements listed in the formula. For the Ford example, pour paint toner 02 until the scale reaches "4.44" grams, and so on until all the tints have been added to the mixing cup.
8. Remove the mixing cup from the scale and close the lid tightly. Place the cup in a paint shaker for about 5 minutes. Begin vehicle preparation.

9. You can save leftover containers of paint tint for future use. However, experience shows that most leftover paint is never used again. It is better to give the paint to the customer or to dispose of it.
10. A. After the paint mixture has been thoroughly agitated on the shaker, you need to prepare the paint for application to the vehicle by mixing it with Reducer.
You must add Reducer to Base coat. You must add Activator and Hardener to Clear coat.

    B. In the Ford example you will have 4.82 grams of paint. Now place an empty 1/4 oz. cup on the scale. Push tare so the scale reads 0.00. From the cup with 4.82 grams of paint pour into empty cup until scale reads 3.00 grams. Now add 1.5 grams of reducer (2 to 1 Ratio).
    Mixing Ratios for Base and Clear used for Chip or Scratch Repair
    2 Grams Base coat + 1 Grams Reducer
    3 Grams Clear coat + 1 Gram Hardener + 1 Gram Activator
11. If you are only doing chip & small scratch repair, there is no need to apply clear coat over the base coat. Instead, add 10% to 15% hardener to the reduced base coat. For example, if you have 5.0 grams of reduced base coat, add .5 to .75 grams of hardener. This will provide needed gloss to base coat for 1-step repair.
12. When you use base coat paint, you must apply a clear coat to the touch-up area.
Note: Mixing ratios for Clear coat are as follows:
Clear coat = 3 Parts Clear + 1 Part Hardener + 1 Part Activator

3.2.2. Paint straining

The defects which are commonly found in paint work are as follow

Blistering, Blooming, Fading. Flaking, Flashing, And Grinning. Running, Sagging**Cause**: Liquid **solvent** (thinners/reducers) becomes 'trapped' in the **paint** film when the surface layer skins over too quickly, preventing their evaporation into the atmosphere. **Solvents** that vaporize within the **paint** film leave bubbles, pinholes or craters as they push

3.2.3. Paint thinning

Thinning paint includes certain techniques that will ensure you of excellent results that you expect.

Practical Paint Thinning Tips

Latex is a type of water-based paint, which you can thin using water. On the other hand, oil-based paints require the use of oil-based type of paint thinner. Generally, latex has a much thicker consistency that oil-based ones. Hence, you will need to thin it first before use to ensure the even and smooth application on any surface.

Steps-

1. **Check the quality of the paint to makes sure it needs thinning**
   Keep in mind that some latex paints require thinning while others may be ready for use. So, it helps to begin by conducting a test that will check if thinning is even necessary
   You may do so by inserting a tool in the paint can such as a stick that is used for stirring.

   If you notice that the paint begins to drip easily off the tool, then this means there is no need to thin it. On the other hand, a clumpy or thick quality of paint that remains on the stirring tool means that you need to thin it to ensure a smoother application.

2. **Use the right amount of water to begin thinning the paint**
   When you have checked thoroughly the quality or consistency of the paint, then you can begin applying some water to it. Stirring just won't work, so you will need the right amount of water and mix this with the paint. To start, prepare an empty can where you can thin a gallon of paint. These steps will help you start thinning the paint properly:

   - Fill the empty can with half a gallon of water.
   - Pour the latex paint and 1/2 gallon of water.
   - Then, add another half a gallon of water and pour the paint mixed with some water, in a back and forth manner.
   - If you wish, you may also add some water to a few gallons of tinted type of paint. This way, you can obtain the similar consistency and color in the can of paint

   As you stir the paint well, the quality will become much smoother.
   Keep in mind, though, that the stirring rod for the electric rod is quite sharp.
   This means, you will need to get rid of the stirring attachment after you have unplugged the electric drill's power cord.

As you stir the paint, consider applying these techniques:

- Stir the paint manually for about 5 to 10 minutes since stirring for only a minute or two will not ensure the proper mixing of the paint.
- Apply an upward combined with a downward and spiral motion when you stir the paint.
- If possible, you may consider thinning the latex paint by pouring paint in a back and forth manner using two empty cans of paint.
- For over a gallon of latex paint with custom color, you may pour the paint back and forth several times, also considered as the boxing method.

Another way of thinning water-based paint is by using commercial products such as a thinning additive. For instance, these additives are useful when thinning or conditioning the paint. Hence, they help you apply paint easily without creating brush marks.

When it comes to buying paint thinner, be sure that you purchase one that is compatible to the paint you are planning to thin. Then, add the thinner in the right quantity to ensure the smooth quality and texture necessary for painting it easily on any surface. Consider adding thinner gradually and in small amounts, and simply pour in a few more until you have determined the quantity needed in thinning the paint properly.

By applying these techniques, you can make sure that the paint is thinned appropriately before use.

3.2.4. Paint matching

MATCH COLOR

I. Equipment and materials needed :- Spray gun, and Tinting colors

II. Procedure

2. Spray a test card
   a. Spray over light gray primer card
   b. Spray over dark gray primer card
   c. Spray over red oxide primer card
3. Check against color on vehicle and choose closest match
4. Try spray gun techniques
   a. Spray wet
   b. Spray dry
   c. Increase gun pressure

d. Decrease gun pressure
e. Increase. ‘in distance
f. Decrease gun distance

(NOTE: Above procedure will lighten or darken colors.)

5. Check match against color on vehicle and choose closest match
6. Tint color
   a. Use only a small amount of paint
   b. Add only drops of tinting color at a time
   c. Spray on test card and compare to automobile
      - Check in daylight
      - Check in artificial (shop) light
   d. Use tinting chart to choose solution to get the necessary match

Base Color (Basecoat): A color coat requiring a clear coat. Base Color provides color and appearance, while the clear coat provides gloss as well as UV protection and chemical resistance. Base color is also referred to as a“two stage” coating because you first apply Base Color, then secondly the Gloss Clear.

There are also “three stage” Base Colors consisting of a solid Base Color (stage1), a metallic or pearl second Base Color (stage2),and then finally Gloss Clear(stage3).

Base Color can be matched to any OEM (Original Equipment Manufacturer)vehicle .Base Wheel Color is designed to match most popular OEM Wheels

Clear Gloss (Clear coat): The clear, non-pigmented top coat that is applied over a Base Color (basecoat). Most late-model cars have factory-applied clear coat paints. Clear coat provides gloss and protection, increases paint durability, and provides resistance to harmful environmental effects.

If you have chips, nicks or scratches that have not penetrated the paint, and the color is still showing, you may be able to touch up directly with Clear Glos

3.2.5. Hand painting procedures including rolling

The use of brushes or rollers for touch-up/repair on localized damaged surfaces where proper coating by spray application is not feasible may be used upon COMPANY approval.

When using brushes, ensure that a smooth coat, as uniform in thickness as possible, is obtained with no deep or detrimental brush marks.

Paint shall be worked into all crevices and corners. Runs and sags shall be brushed out immediately during paint application

3.2.6. Buffing and polishing

Polishing and **buffing** are finishing processes for smoothing a work piece's surface using an abrasive and a work wheel or a leather strop. ... **Polishing** is a more aggressive process while **buffing** is less harsh, which leads to a smoother, brighter finish

Buffing will remove this excess product, leaving a smooth and even finish with increased gloss. In the case of **buffing** polish, you are essentially removing excess product in order to remove old polish residue, paint residue and make it easier to see whether the surface is **done**, or if it needs more **polishing**

This is an adjective which, in youth **slang**, means attractive or well-toned. Somebody who is **buff** has an attractive body, they look 'fit'

Paint Mixing, Matching, and Applying

1. Determine type and color of paint already on vehicle by manufacturer's vehicle information label.
2. Shake, stir, reduce, catalyze/activate, and strain paint according to manufacturer's procedures.
3. Apply finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for the finish being applied.
4. Apply selected product on test and let-down panel in accordance with manufacturer's recommendations; check for color match.
5. Apply single stage topcoat for refinishing.
6. Apply basecoat/clear coat for panel blending or partial refinishing.
7. Apply basecoat/clear coat for overall refinishing.
8. Denib, buff, and polish finishes where necessary.
9. Identify the types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials, preparation, and refinishing procedures.
10. Refinish rigid, semi-rigid and flexible plastic parts.
11. Clean, condition and refinish vinyl (e.g. upholstery, dashes, and tops).
12. Apply multi-stage (tricot) coats for panel blending or overall refinishing.
13. Identify and mix paint using a formula.
14. Identify poor hiding colors; determine necessary action.
15. Tint color using formula to achieve a blendable match.
16. Identify alternative color formula to achieve a blendable match.

ADJUSTING THE SPRAY (For suction feed spray gun)

A good spray pattern depends on the proper mixture of air and paint droplets much like a fine tuned engine depends on the proper mixture of air and gasoline. There are three basic adjustments, which under normal conditions will give the proper spray pattern, degree of wetness, and air pressure for suction feed guns.

1. Adjust the air pressure to the specification indicated on the paint can
2. Set the size of the spray pattern using the fan adjustment or pattern control knob
3. Set the fluid control knob to regulate the amount of paint according to the selected pattern size: backing the knob out increases the paint flow turning the knob decreases paint flow.

Testing the Spray Pattern

After setting the air pressure, the fan size, and the fluid flow, tests the spray pattern on a piece of masking paper or newspaper.

Hold the gun 6 to 8 inches for lacquer, 8 to 10 inches for enamel. Pull the trigger all the way back and release it immediately. This burst of paint should leave a long, slender pattern on the test paper.

Spraying primer-surfacer usually requires a smaller spray pattern. Turn the pattern control knob in until the spray pattern is 6 to 8 inches wide. For spot repair, the pattern should be about 5 to 6 inches from top to bottom

Painting the Vehicle

1. Thin the topcoat you'll be using with thinner, just like primer. Recommended ratios will be on the back of the paint can.
2. Apply topcoat using the same techniques as with the primer. The painting and curing times will also be quite similar to the primer, taking about 10 minutes to paint each panel and 20 minutes to an hour to cure. As with the primer, allow the paint to dry thoroughly between each coat.
3. 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.
4. 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:

1. 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
2. Hold the gun level and perpendicular to the surface, otherwise uneven paint film will result
3. 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

4. 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.
5. Release the trigger at the end of each pass
6. Difficult areas such as corners and edges should be sprayed first
7. 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
8. 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.
9. The last pass should be made with the lower half of the spray pattern below the surface being painted
10. 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.

Lacquering the Vehicle

- Repeat the painting/primer steps with the lacquer, covering with 1-2 coats.
- While clear coat is still wet, remove any masking from areas that weren't being painted. Use caution to prevent blemishing the clear coat or getting tape stuck in it.
- Allow the lacquer to cure for the recommended time. Once dry, inspect the vehicle for any blemishes or runs. Sand these down lightly and respray.
- Buff your vehicle with a buffer, making sure not to linger on one spot too long as this could burn the paint.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Which of the following materials is used to mix most paints?
   A/ a reducer, B/ thinner C/ hardener D all are the correct answers.
2. If the paint is too thin, what will happen?

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

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

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet 1	Surface Preparation

Procedures for surface Preparation

Steps:-

1. **Clean and Sand the Surface (Wash the car)**
2. **Check for rust and remove any you find**
3. **Apply a wax and grease remover to the area being fixed**
4. **Sand the area to prep the surface**
5. **Wash and dry the car touch up areas**

Operation Sheet- 2	Priming and Painting Chipped Areas for hand brushing

Procedures for Priming and Painting Chipped Areas (for hand brushing)

Steps:-

1. **Figure out the exact paint color on your car.**
2. **Buy a matching touch-up paint color**
3. **Apply rust arrestor on the chipped area**
4. **Apply primer, if necessary**
5. **Test the paint**
6. **Apply the touch-up paint to the primed area**
7. **Allow drying time between coats and after the layers are applied**

Finishing the surface

8. **Sand the touched-up area until it is smooth**
9. **Apply the top coat.**
10. **Sand the area once more with 3000-grit sandpaper**
11. **Polish and wax the entire car**

Operation Sheet-3	Paint Mixing, Matching, and Applying

Procedures for Paint Mixing, Matching, and Applying

Steps:-

1. Determine type and color of paint already on vehicle by manufacturer's vehicle information label.
2. Shake, stir, reduce, catalyze/activate, and strain paint according to manufacturer's procedures.
3. Apply finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for the finish being applied.
4. Apply selected product on test and let-down panel in accordance with manufacturer's recommendations; check for color match.
5. Apply single stage topcoat for refinishing.
6. Apply basecoat/clear coat for panel blending or partial refinishing.
7. Apply basecoat/clear coat for overall refinishing.
8. Denib, buff, and polish finishes where necessary.
9. Identify the types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials, preparation, and refinishing procedures.
10. Refinish rigid, semi-rigid and flexible plastic parts.
11. Clean, condition and refinish vinyl (e.g. upholstery, dashes, and tops).
12. Apply multi-stage (tricot) coats for panel blending or overall refinishing.
13. Identify and mix paint using a formula.
14. Identify poor hiding colors; determine necessary action.
15. Tint color using formula to achieve a blendable match.
16. Identify alternative color formula to achieve a blendable match.

Operation Sheet-4	Painting the Vehicle (Application stroke)

Procedures for Painting the Vehicle (Application stroke)

Steps:-:

1. Thin the topcoat you'll be using with thinner, just like primer. Recommended ratios will be on the back of the paint can.
2. Apply topcoat using the same techniques as with the primer.
3. Apply up to 3-4 coats of paint, or as your supplies allow.
4. 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

5. Hold the spray gun at the proper distance from the surface
6. Hold the gun level and perpendicular to the surface,
7. Do not fan the gun and do not use wrist motions if a uniform film is desired.
8. Move the gun with a steady deliberate pass, about 1 foot per second.
9. Difficult areas such as corners and edges should be sprayed first
10. Generally, start at the top an upright surface such as a door panel.
11. 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.
12. The last pass should be made with the lower half of the spray pattern below the surface being painted
13. 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.

Lacquering the Vehicle

14. Repeat the painting/primer steps with the lacquer, covering with 1-2 coats.
15. While clear coat is still wet, remove any masking from areas that weren't being painted. Use caution to prevent blemishing the clear coat or getting tape stuck in it.
16. Allow the lacquer to cure for the recommended time. Once dry, inspect the vehicle for any blemishes or runs. Sand these down lightly and respray.
17. Buff your vehicle with a buffer, making sure not to linger on one spot too long as this could burn the paint.

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 8:00hour.

Task 1. Prepare surface

Task 2. Prime and paint chipped areas (hand brushing)

Task 3. Mix, Match, and Apply Paint

Task 4. Paint the Vehicle/Application stroke

List of Reference Materials

e. https://www.com.material-safety-data-sheet-msds-definition-purpose.
f. https://www.perforce.comhow-write-software-requirements-specification-srs-document
g. https://www.implement-iso-quality what-does-iso-mean
h. Auto Repair For Dummies, 2nd Edition
i. https://www.Polishing_(metalworking)
j. AUTO BODY REPAIR Brunswick Pike, Lawrenceville, NJ 08648
k. www.shopware – usa'com
l. Automotive Mechanics, 10th edition By: Crouse/ Anglin
m. Modern Automotive Technology By: James E. Duffy
n. Manufacturer's Manual Toyota Corporation
o. AUTO BODY REPAIR
p. Paint touch up technique Tool Free 1-800-284- 0123
q. AUTO BODY REPAIR SURFACE PREPARATION AND REFINISHING
2572 Brunswick Pike, Lawrenceville, NJ 08648
www.shopware – usa'com

- Paint touch up technique Tool Free 1-800-284- 0123

VEHICLE BODY REPAIRING AND PAINTING

Level II

Learning Guide # 43

Unit of Competence: - Apply Paint Touch-up Techniques

Module Title: Applying Paint Touch-up Techniques -

LG Code: EIS VRP2 M07 LO4-LG-43

TTLM Code: EIS VRP2 TTLM 0919 v1

LO 4: Cleanup work area and maintain equipment

Instruction Sheet	Learning Guide # 43

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

- Collecting and storing ***materials*** that can be reused
- Removing waste and scrap
- Cleaning and inspecting equipment and work area
- Tagging unserviceable equipment and identifying faults
- Completing operator maintenance.
- Maintaining ***tooling***

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

Specifically, upon completion of this Learning Guide, **you will be able to –**

- Collecting and storing ***materials*** that can be reused
- Removing waste and scrap following workplace procedure
- Cleaning and inspecting equipment and work area for serviceable condition in accordance with workplace procedures.
- Tagging unserviceable equipment and identifying faults in accordance with workplace procedures.
- Completing operator maintenance in accordance with manufacturer/component supplier specifications and worksite procedures
- Maintaining ***tooling*** in accordance with workplace procedures

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number **3 to 25**
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1” **in page 93**
5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).
6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
7. Submit your accomplished Self-check. This will form part of your training portfolio.

8. Read the information written in the “Information Sheet 2”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
9. Accomplish the “Self-check 2” **in page 95.**
10. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 2).
11. Read the information written in the “Information Sheets 3 . Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
12. Accomplish the “Self-check 3” **in page 97**.
13. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 3).
14. Accomplish the “Self-check 4” **in page 99**
15. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 4
16. Accomplish the “Self-check 5” **in page 102**
17. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 5
18. Accomplish the “Self-check 6” **in page 109**
19. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 6
20. If you earned a satisfactory evaluation proceed to “Operation Sheet 1**” in page 110.** However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
21. Read the “Operation Sheet 1” and try to understand the procedures discussed.
22. If you earned a satisfactory evaluation proceed to “Operation Sheet 2” **in page 111**. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
23. Read the “Operation Sheet 2” and try to understand the procedures discussed..
24. If you earned a satisfactory evaluation proceed to “Operation Sheet 3” in page 112 However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #2.
25. Read the “Operation Sheet 3” and try to understand the procedures discussed

Do the “LAP test” **in page 113** (if you are ready). Request your teacher to evaluate your performance and outputs. Your teacher will give you feedback and the evaluation will be either satisfactory or unsatisfactory. If unsatisfactory, your teacher shall advice you on additional work

Information Sheet-1	Collecting and storing ***materials*** that can be reused

4.1. Collecting and storing ***materials*** that can be reused

4.1.1. Environmental protection requirements

An **Act** to provide for the **protection** and improvement of **environment** and for matters connected there with. 1. Short title, extend and commencement - (1) This **Act** may be called the **Environment** (**Protection**) **Act**, 1986.

The U.S. Environmental Protection Agency's (EPA) new NESHAP 6H rule will impact automotive body shops using paint that contains Hazardous Air Pollutants (HAPs), commonly found in most automotive paints, primers and clear coats.

The actual rule is 40CFR63 Subpart HHHHHH(6H) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) for ***Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources*.** In most cases, state environmental regulatory agencies are administering the rule for the EPA.

Initial notification forms are due by January 11, 2010 and a notification of full compliance status is due by March 11, 2011. The rule is one of many industry specific regulations for the control of hazardous air pollutant. The 6H rule – which has come to be known in the collision repair industry as the "Paint Rule" – is specific to metal and plastic surface coating operations at area sources including manufacturing and auto body. Auto body shops are not being selectively targeted but are included in a group of rules within a broad spectrum of industries.

The rule only applies if coatings contain *targeted HAPs*:

- Lead (Pb), (> 0.1 percent)
- Manganese (Mn), (> 1.0 percent)
- Nickel (Ni), (> 0.1 percent)
- Cadmium (Cd), (> 0.1 percent)
- Chromium (Cr), (> 0.1 percent)

The purpose of this rule is to reduce emissions of lead, nickel, cadmium, chromium and manganese. These chemicals are designated hazardous air pollutants known or

suspected to cause cancer and other adverse health effects and can be found in paint used in the automotive refinishing industry.

The NESHAP 6H Rule requirements, include:

▫ Notification Form by January 2010

▫ Paint booth exhausts systems implementation of 98% efficient booth filters

▫ Spray booths/prep stations must be used

▫ Spray guns must be efficient types, such as HVLP

▫ Spray gun cleaning does not allow atomization of thinner through gun for cleaning and recommends an automated enclosed gun wash

▫ Painter training requires gun set-up and spray techniques training material be presented along with a hands-on requirement by January 2011

▫ Final Notification of full compliance by March 2011

▫ Five-year continuing education

4.1.2. Material disposal and storage

Storage

Flammable Materials:

Store Flammable material in safety container petroleum products like diesel fuel, lubricants, body paints are flammable at normal temperature as well as when heated and should be stored outside the work shop. Engines should never be run in closed spaces with no ventilation system.

Oily rugs can catch fire without a spark or flame, by spontaneous combustion. To prevent this always store oily rugs and west in a fire proof safety container. Do not over fill the safety container.

Personal protective equipment

For personal safety, proper closing, overhauls and housekeeping are necessary.

Buttoned up one piece overalls should be worn. Light safety helmet should be used when working under the vehicle. Safety foot wear should be worn.

Before starting work on the vehicle wrist watches or rings should be removed. Workshops should be clean free; from idle equipment, spilt oil or grease. First aid kit should be available in the work place.

Cover long hair so it does not get caught in moving equipment. Were safety glasses any time we are in the shop to protect your ice. Gloves should be worn when working on rough or sharp metal and hot parts

Wastage Disposing Method

A. **Cleaning:**

A layer of oil, grease and dirt gets coated to the vehicle and its parts with time and usage. Before performing in maintenance work on the vehicle the unwanted layer should be removed. This can be done by hand or by means of certain cleaning methods

A safe shop is the clean shop. You can make the shop safe by keeping the floor clean. Cleaning up spilled liquids before starting work will make final clean up easier and quicker.

B. A place for burning wastes or to bury them should be prepared far away from the workshop.

Material movement and storage activities should be fully integrated to form a coordinated, operational system which spans receiving, inspection, storage, production, assembly, packaging, unitizing, order selection, shipping, transportation and the **handling** of returns

Whenever **materials are dropped more than 20 feet** to any point lying outside the **exterior** walls of the building, an enclosed chute of wood, or equivalent **material**, shall be used

The basic **function of material handling** is to choose most appropriate **materials handling** equipment which is safe and can fulfill **material handling** requirements at the minimum possible overall cost and to choose production machinery and assist in plant layout so as to eliminate, as far as possible, the need of **materials**

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the two methods of wastage disposing?

2. The acronym NESHAP stands for:-

3. Among those around 11/eleven **material** movement and storage activities list at least 6/six of them.

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-2	Removing waste and scrap

4.2. Removing waste and scrap

Scrap consists of recyclable materials left over from product 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 are also recovered for **recycling**.

Scrap value is the worth of a physical asset's individual components when the asset itself is deemed no longer usable. ... An item's **scrap value** is determined by the supply and demand for the materials it can be broken down into. **Scrap value** is also referred to as the **residual value**, **salvage value**, or break-up **value**

Simple Ways to Reduce Waste In Your Home

1. Get to know the rules of recycling.
2. Ditch the plastic bags.
3. Make a meal plan.
4. Start relying on reusable containers.
5. Start composting.
6. Learn to repair rather than discard.
7. Cancel unnecessary mail.
8. Stop using disposable plates.

Here are types of waste

- Liquid Waste. Liquid waste is commonly found both in households as well as in industries. ...
- Solid Rubbish. Solid rubbish can include a variety of items found in your household along with commercial and industrial locations. ...
- Organic Waste. Organic waste is another common household. ...
- Recyclable Rubbish. ...
- Hazardous Waste.

Most recycling pick-up companies accept **metal**, so unless the **metal** you have is valuable, **recycle** it in your blue bin. You can make the most money on aluminium, brass and copper at the **scrap yard**. Bronze, cast **iron**, **steel** and tin are all recyclable in the blue bin.Jul 30, 2019

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

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

3. What are the five types of waste?

4. What is Scrap value?

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-3	Cleaning and inspecting equipment and work area

4.3. Cleaning and inspecting equipment and work area

Keeping work place clean and safe

1. Prevent Slips, Trips, and Falls. Keep floors clean and dry. ...
2. Eliminate Fire Hazards. ...
3. Control Dust. ...
4. Avoid Tracking Material. ...
5. Prevent Falling Objects. ...
6. Clear Clutter. ...
7. Store Items Properly. ...
8. Use and Inspect Personal Protective Equipment and Tools.

Effective work place cleaning to keep everyone safe

1. Ensure all spills are immediately cleaned up. ...
2. Maintain clean light fixtures to improve lighting efficiency.
3. Keep aisles and stairways clear. ...
4. Regularly inspect, clean and repair all tools

Preparing and maintaining safe working areas

1. Provide clean floors and stairs, with effective drainage where necessary.
2. Provide clean premises, furniture and fittings.
3. Provide containers for waste materials.
4. Remove dirt, refuse and trade waste regularly.
5. Clear up spillages promptly.
6. Keep internal walls or ceilings clean.

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Mention those about four effective work place cleaning to keep everyone safe

2. **List those about 6/six ways of Preparing and maintaining safe working areas**

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-4	Tagging unserviceable equipment and identifying faults

4.4. Tagging unserviceable equipment and identifying faults

How do you test and tag equipment?

It involves two parts: first visually inspecting the **appliance** for any damage, followed by electrically **testing** it with a Portable **Appliance Tester**. Once **tested**, the item is placed with a **tag** to confirm that it has in fact been **tested**, along with showing who **tested** it, the **test** date and when the next **test** is due.

A Personal Danger **Tag** is red and black on a white background and is used for **tagging** equipment or machinery. It is attached to the power source to prevent inadvertent or unauthorized operation of equipment during repairs, installation or maintenance. **Tags** can be obtained from the WHS Team. **Out of service Tag**.

As a guide, we **often** recommend that at a minimum, your **should** plan laboratory **equipment servicing** for at least once a year, regardless of how busy your machinery is.

An effective lockout/tag out program should include the following steps.

Step 1: Detailed procedures for equipment. ...

Step 2: Notify affected employees. ...

Step 3: Shut down equipment properly. ...

Step 4: Disconnect all primary energy sources. ...

Step 5: Address all secondary sources. ...

Step 6: Verify the lockout.

Equipment maintenance is any process used to keep a business's **equipment** in reliable working order. It may include routine upkeep as well as corrective **repair** work. **Equipment** may include mechanical assets, tools, heavy off-road vehicles, and computer systems.

Here are five top tips for large machinery maintenance:

1. Stay on top of large machinery operator training. ...
2. Add and test lubricants frequently. ...
3. Check for signs of wear. ...
4. Keep large machinery clean, and maintain a clean environment. ...
5. Have a maintenance and repair schedule, and keep good records

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. ---------- is any process used to keep a business's equipment in reliable working order. It may include routine upkeep as well as correct repair work. Equipment work.

   A/ Equipment maintenance B/ Equipment tagging

   C/ Equipment identification D/ Equipment dispasal

2. **List about 6/Six steps of an effective lockout/tag out program**

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-5	Completing operator maintenance

4.5. **Completing operator maintenance**

MAINTENANCE of TOOLS and Equipment

Tools are designed to make a job easier and enable you to work more efficiently. If they are not properly used and cared for, their advantages are lost to you. Regardless of the type of work to be done, you must have, choose, and use the correct tools in order to do your work quickly, accurately, and safely. Without the proper tools and the knowledge of how to use them, you waste time, reduce your efficiency, and may even injure yourself.

A place for everything and everything in its place" is just good common sense. You can't do an efficient repair job if you have to stop and look around for each tool you need. The following rules will make your job easier and safer.

- KEEP EACH TOOL IN ITS PROPER STOWAGE PLACE.

The Tool Control Program is based on the concept of a family of specialized toolboxes and pouches configured for instant inventory before and after each maintenance action. The content and configuration of each container is tailored to the task, work center, and equipment maintained. Work center containers are assigned to and maintained within a work center. Other boxes and specialized tools are checked out from the tool control center (tool room).

- YOUR TOOLS IN GOOD CONDITION**.**

Protect them from rust, nicks, burrs, and breakage.

- KEEP YOUR TOOL ALLOWANCE COMPLETE**.**

When you are issued a toolbox, each tool should be placed in it when not in use. When the

toolbox is not actually at the work site, it should be locked and stored in a designated area.

NOTE:- An inventory list is kept in every toolbox to be checked before and after each job or maintenance action, to ensure that all tools are available to do your work, and to ensure that they are accounted for after you have completed your work.

- USE EACH TOOL ONLY FOR THE JOB IT WAS DESIGNED TO DO**.**

Each particular type of tool has a specific purpose. If you use the wrong tool when

performing maintenance or repairs, you may cause damage to the equipment you're working on or damage the tool itself. Remember, improper use of tools results in improper maintenance. Improper maintenance results in damage to equipment and possible injury or death to you or others.

- SAFE MAINTENANCE PRACTICES.

Always avoid placing tools on or above machinery or an electrical apparatus. Never leave tools unattended where machinery or aircraft engines are running.

- NEVER USE DAMAGED TOOLS.

A battered screwdriver may slip and spoil the screw slot, damage other parts, or cause painful injury. A gauge strained out of shape will result in inaccurate measurements.

CARE OF HAND TOOLS

Principles that apply to the care of hand tools:-

Tools are expensive; tools are vital equipment.

When the need for their use arises, common sense plus a little preventive maintenance prolongs their usefulness. The following precautions for the care of tools should be observed:

- Clean tools after each use. Oily, dirty, and greasy tools are slippery and dangerous to use.
- NEVER hammer with a wrench.
- NEVER leave tools scattered about. When they are not in use, stow them neatly on racks or in toolboxes.
- Apply a light film of oil after cleaning to prevent rust on tools.
- INVENTORY tools after use to prevent loss.

Self-Check -5	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write those(about 6/six) rules that will make tools and equipment maintenance job easier and safer

2. What are precautions that should be observed for the care of tools (list about 6/six precations)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-6	Maintaining *tooling*

4.6. **Maintaining *tooling***

How do you maintain tools and equipment?

Steps

1. Clean your tools. Cleaning the tools regularly is essential to their proper functioning.
2. Protect electrical cords. Airlines and electrical cords are prone to heavy damage since they are generally in the way of construction vehicles, and foot traffic. ...
3. Lubricate tools. ...
4. Inspect tools regularly. ...
5. Store tools with care

Four general **types of maintenance** philosophies can be identified, namely corrective, preventive, risk-based and condition-based **maintenance**.

Properly Maintaining Your Cleaning Tools

1. Basics. Clean brooms, brushes and mops after that day's use. ...
2. Brooms. Comb out broom fibers regularly to remove any debris. ...
3. Storage. Always use a holder to keep brooms stored off the floor or store with the bristles upright. ...
4. Cotton Mops. After each use, rinse cotton mops in hot water and white vinegar. ...
5. Scrub brushes.

Steps in Cleaning Tools

1. Wear protective clothing and goggles.
2. Gather the tools to be cleaned in the designated area for cleaning.
3. Segregate the tools according to the kind of dirt they have.
4. Measure and pour enough amount of cleaning solvent to the washing pan.
5. Submerge the tools in the washing pan.
6. Use paint brush to remove the dirt from the tools.
7. Get the tools from the washing pan and wipe them with rags until dry.
8. Arrange the tools in designated rack or cabinet.
9. Clean and store all materials used for cleaning.

4.6.1. **Spray guns maintaining/ Cleaning process**

Prior to the introduction of paint gun cleaning systems, all spray equipment was cleaned by hand using the following basic steps:

1. Remove all remaining paint from the cup.
2. With the air hose and cup removed, pull the gun trigger to remove all remaining paint from the siphon tube.
3. Rinse the cup with a small amount of thinner.
4. Pour clean thinner into the cup and reattach it to the gun.
5. With the air supply reattached, spray the thinner through the gun to remove any paint remaining in the interior orifices.
6. Remove the cup and pour thinner out of the cup.
7. Wipe off the outside of the gun, and inside and outside of the cup using a rag or paper towel.
8. Remove the air cap and clean with a cleaning brush. A cleaning brush is also used to clean other external moving parts and behind the trigger.
9. Reassemble the gun and return it to its storage area.

Many painters remove the air cap from the gun and place it in the cup.
A small amount of thinner is left in the cup so the cap can soak during storage.
Using metal objects to clean the small passageways can result in severe damage which greatly reduces the efficiency of the spray gun. If needed , use a soft wooden toothpick to remove obstructions from the orifices.
These manual cleaning tech n i q u e s, still commonly used in many small shops, release an excessive amount VOCs to the atmosphere.

4.6.2. Maintaining Air pressure regulators

Procedure

1. Locate the air regulator drain valve
2. Release the valve

(NOTE: Water will run out of valve under air pressure. Allow to do so until air becomes dry. In systems where large volumes of air are used, draining of the regulator should be done several times a day. The air regulator should be drained every morning.)
(CAUTION: System is under high air pressure. Do not get foreign matter in eyes or on skin.)

then :-

1. **Rinsing regulator with fresh (worm) water**
2. **Rinse it within few hours after the dive**
3. **Dry the dust cap before putting it on the first stage**
4. **Do not soak the first stage**
5. **Soak some regulator parts for a while**
6. **Wiggle the second stages underwater**
7. **Do not press the purge button**
8. **Clean the mouthpieces properly.**

4.6.3. Maintaining Air compressors

DRAIN AND SERVICE AN AIR COMPRESSOR

I. Tools, equipment, and materials needed: - Air compressor and Oil

II. Procedure

1. Turn off electric power to compressor
2. Drain air from compressor (NOTE: Leave air valve open nearest compressor.)
3. Locate water drain and open (NOTE: If system has a high side drain valve with an internal siphon tube, air pressure will have to remain in the tank to make it drain. If valve is in the bottom, let all air pressure out of the tank to prevent air lock swhich will not allow the tank to drain properly.)
4. Locate air intake filter
   - 4.1. Dry filter (NOTE: If dirty, replace.)
   - 4.2. Oil bath -Clean filter and refill with oil (NOTE: Use recommended weight to prevent the oil from being sucked into the compressor.)
5. Locate pump crankcase oil drain plug and remove
   - 5.1. Drain oil into drain pan
   - 5.2. Install plug and tighten (NOTE: Always tighten a drain plug at the time you install it.)
   - 5.3. Fill compressor crankcase (NOTE: Follow the directions provided by the manufacturer as to type oil, weight, and amount.)

Air Compressor maintenance Guide

How to Make Your Air Compressor More Efficient

1. Improve the Quality of the Air Intake.
2. Match the Air Compressor Controls.
3. Improve System Design.
4. Consider Compressed Air Needs.
5. Minimize Pressure Drop.
6. Maintain Your Compressor.
7. Quincy's Efficient Air Compressors.

The process and regularity of **compressor** service and maintenance depends on the individual processor. For example, a **compressor** using petroleum-based oil needs an oil-change every 500 hours of service. A unit using synthetic oil raises that interval to 2,000 hours of service.

4.6.4. Maintaining/Cleaning Spray booths

How do you clean paint booth?

If you have a smaller **paint booth**, you can use a simple scrubbing brush with a solution of water and **paint** remover to **clean** it. Rinse with water once you've sufficiently cleaned **paint** from the **booth**. If you have a larger **paint booth**, you'll want to use a pressure washer to properly **clean** it.

Regularly Replace **Filters**

Replacing the extract **filters** on your **spray booth** between services is just as important as the **regular** maintenance checks to ensure your **spray booth** is working both to its optimum efficiency and productivity, as well as ensuring you remain compliant with EPA legislation.

4.6.5. Mixing equipment

1. **Wash latex paint off the mixer bit with worm water. wipe oil paint from the lid with rag soaked in paint thinner.**
2. **If you are using the entire can of paint, punch a hole in the paint lead to make the splatter shield instead of** using card board

Maintaining Paint Touch-up Equipment

1. CLEAN THE AIRBRUSH THOROUGHLY AFTER EACH USE. Remove the mixing cup from the airbrush. Hold your finger over the spray end of the airbrush. Push the lever so the paint remaining in the airbrush goes into the cup.
2. Place the airbrush and siphon on a container filled with paint thinner. Spray the airbrush, turning the spray tip adjuster in and out, until it is completely flushed out.

3. Disassemble the airbrush and clean it thoroughly with a pipe cleaner that has been dipped in Reducer. Also clean the siphon lid.

You must disassemble in order to have the airbrush perfectly clean. Spraying thinner through it, or soaking in thinner is not satisfactory. It must be disassembled and cleaned.

4. The airbrush is ready to use with another paint color or to store away.

4.6.6. Paint stirring equipment

As a guide, **often** recommend that at minimum, plan **laboratory equipment** servicing for at least once a year, regardless of how busy your machinery is. If using them very intensively, then a 6 monthly servicing schedule **can** ultimately ensure that **laboratory equipment** is kept in top condition.

Clean work areas upon completion of an experiment or at the end of each day.

Bench tops and bench liners should be free of visible contamination.

Reduce the risk of slips, trips, and falls by **cleaning** up liquid or solid spills immediately, **keeping** doors and drawers closed and passageways clear of obstructions

A List of Basic Chemistry Apparatus

- Safety goggles and safety equipment.
- Beakers.
- Erlenmeyer flasks, AKA conical flasks.
- Florence flasks, AKA boiling flasks.
- Test tubes, tongs, and racks.
- Watch glasses.
- Crucibles.
- Funnels.

A magnetic **stirrer** is a device widely **used in** laboratories and consists of a rotating magnet or a stationary electromagnet that creates a rotating magnetic field. This device is **used to** make a stir bar, immerse in a liquid, quickly spin, or stirring or mixing a solution, for example.

Overhead stirrers that are ideal for every stirring need. These **Overhead Stirrers** are equipped for constant speed or variable speed. They are designed for emulsions, suspensions, water or oil mixtures that require high torque or extremely high speeds

4.6.7. Paint straining and thinning equipment

Despite the exposure to detergent and water, your washing machine can get dirty and retain odors. When clothing or rags with paint thinner are laundered, residual odor can be left behind inside the washing machine. When left in the machine, paint thinner smell can be transferred to the next load of wash. To avoid this occurrence and remove the chemical odor from your washing machine, you must use effective cleaning supplies and methods to clean and deodorize your appliance

Paint thinner smell in the washing machine can make clothing smell, too

Step 1:-Wet a cleaning cloth with full-strength white vinegar.

Apply a dusting of baking soda to the wet cloth.

Step 2:- Scrub the inside of the washing machine, including the underside of the lid or door. Add more vinegar and baking soda as needed to clean the washing machine and deodorize the smell of paint thinner.

Step 3:- Rinse the inside of the washing machine by wiping it with a damp cloth.

Rinse the cloth frequently to remove baking soda residue.

Step 4:- Bleach helps to clean, sanitize and deodorize the washing machine.

Pour 1/2 cup of chlorine bleach into the bleach dispenser. Fill the washing machine with hot water and run it on a full cycle.

Step 5:- Open the washing machine door and allow the inside to air dry completely

4.6.8. Maintaining Machine buffs and polishes

Any paint coating found inadvertently applied to areas where it is not required e.g. machined or polished surfaces, surface of stainless steel or non-ferrous alloys, name plates, manufacturers identification tags, instruments and instrument glasses, sight glasses, control valve stem, high friction grip bolt assemblies, etc. shall be hand wiped clean with thinner or cleaner while the coating is still wet or rubbed down with fine sand paper if it is dry and

restored to their original surface condition.

Self-Check -6	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. A **compressor** using petroleum-based oil needs an oil-change every ---------- hours of service. A/ 200 hours B/ 2000 hours C/ 500 hours D/ 5000 hours
2. A compressor using synthetic oil needs an oil-change every ----------hours of service. A/ 200 hours B/ 2000 hours C/ 500 hours D/ 5000 hours

3. **Mention the way of maintaining tools and equipment (about 5/five)**

4. **What are the four** general **types of maintenance?**

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet 1	**Maintaining** Spray guns

Procedures of maintaining Spray Gun

Steps-

1. Remove all remaining paint from the cup.
2. With the air hose and cup removed, pull the gun trigger to remove all remaining paint from the siphon tube.
3. Rinse the cup with a small amount of thinner.
4. Pour clean thinner into the cup and reattach it to the gun.
5. With the air supply reattached, spray the thinner through the gun to remove any paint remaining in the interior orifices.
6. Remove the cup and pour thinner out of the cup.
7. Wipe off the outside of the gun, and inside and outside of the cup using a rag or paper towel.
8. Remove the air cap and clean with a cleaning brush. A cleaning brush is also used to clean other external moving parts and behind the trigger.
9. Reassemble the gun and return it to its storage area.

Many painters remove the air cap from the gun and place it in the cup.
A small amount of thinner is left in the cup so the cap can soak during storage.
Using metal objects to clean the small passageways can result in severe damage which greatly reduces the efficiency of the spray gun. If needed , use a soft wooden toothpick to remove obstructions from the orifices.
These manual cleaning tech n i q u e s, still commonly used in many small shops, release an excessive amount VOCs to the atmosphere

Operation Sheet 2	Maintaining Air pressure regulators

Procedures for Maintaining Air pressure regulators

Steps: -

1. Locate the air regulator drain valve
2. Release the valve

(NOTE: Water will run out of valve under air pressure. Allow to do so until air becomes dry. In systems where large volumes of air are used, draining of the regulator should be done several times a day. The air regulator should be drained every morning.)

(CAUTION: System is under high air pressure. Do not get foreign matter in eyes or on skin.)

then

1. **Rinse regulator with fresh (worm) water**
2. **Rinse it within few hours after the dive**
3. **Dry the dust cap before putting it on the first stage**
4. **Do not soak the first stage**
5. **Soak some regulator parts for a while**
6. **Wiggle the second stages underwater**
7. **Do not press the purge button**
8. **Clean the mouthpieces properly**

Operation Sheet 3	Maintaining Air Compressors

Procedures for Maintaining Air Compressors

Steps

1. Turn off electric power to compressor
2. Drain air from compressor (NOTE: Leave air valve open nearest compressor.)
3. Locate water drain and open (NOTE: If system has a high side drain valve with an internal siphon tube, air pressure will have to remain in the tank to make it drain. If valve is in the bottom, let all air pressure out of the tank to prevent air lock swhich will not allow the tank to drain properly.)
4. Locate air intake filter
    a. Dry filter (NOTE: If dirty, replace.)
    b. Oil bath -Clean filter and refill with oil (NOTE: Use recommended weight to prevent the oil from being sucked into the compressor.)
5. Locate pump crankcase oil drain plug and remove
    a. Drain oil into drain pan
    b. Install plug and tighten (NOTE: Always tighten a drain plug at the time you install it.)
    c. Fill compressor crankcase (NOTE: Follow the directions provided by the manufacturer as to type oil, weight, and amount.)

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 4:00hour.

Task 1. Maintain Spray guns

Task 2.Maintain Air pressure regulator

Task 3. Maintain Air Compressor

List of Reference Materials

- **EPA Collision Repair Campaign web site CCAR-*Green*Link "Paint Rule"**
- **Stepping Through New EPA Regulations for Auto Body Painting**
- *by Sue Schauls CCAR Technical Advisor*
- https://www.quora.com What-are-the-functions-of-material-handling
- https://www.minutemantrucks.com effective-workplace-cleaning-tips-to-keep-everyone-safe
- https:// safetymanagementgroup.com eight-steps-for-safer-lockouttagout-programs
- https://www.wikihow.com. Maintain-Construction-Tools
- https:// www.portlandcompressor.com.compressor maintenance
- https://www.autobodytoolmart.compaint-booth-organization
- **https://www.Chemistry-Guide-List-of-Common-Laboratory-Equipment-Names-and-Uses**
- Automotive Mechanics, 10th edition By: Crouse/ Anglin
- Modern Automotive Technology By: James E. Duffy
- Manufacturer's Manual Toyota Corporation