VEHICLE BODY REPAIRING AND PAINTING

Level II

Learning Guide #19

Unit of Competence: - Apply Rust Prevention and Sound Deadening Materials

Module Title: Applying Rust Prevention and Sound Deadening Materials -

LG Code: EIS VRP2 M07 LO1-LG-19

TTLM Code: EIS VRP2 TTLM 0919 v1

LO 1: Prepare for work

Instruction Sheet	Learning Guide #19

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 21**.
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 9 -.**
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 12**.
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 22**.
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 25**
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 27**
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 30**
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 32**
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

Information Sheet-1	Using work instructions to determine job *requirements*

1.1. Using work instructions to determine job *requirements*

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.

1.1.1. Job requirements:-

Waste Management

Waste management is the precise name for the collection, transportation, disposal or recycling and monitoring of waste. This material is managed to avoid its adverse effect over human health and environment. Most of the time, waste is managed to get resources from it.

The waste to be managed includes all forms of matter i.e. gaseous, liquid, solid and radioactive matter.

The methods for the management of waste may differ for developed and developing nations. For urban and rural populations, industrial and residential areas it does differ as well. The management of waste in metropolitan and rural areas is general responsibility

of the local government. While the waste that is produced by the industries is managed by the industry itself, in case it is non-hazardous.

Methods for dumping off waste:

Landfill: this method involves burying off the waste

Incineration: This is the dumping off method, which involves combustion for waste materials.

Methods for recycling: - Products like PVC, LDEP, PP and PS are recyclable though they are not collected for recycling. The material, which is composed of a single type, is recyclables and is much easy to work with.

Biological reprocessing:- Waste materials, which come in organic nature, are treated through biological reprocessing. The waste materials with organic nature are plant, food and paper products. This reprocessing or recycling of this organic matter is put to biological decomposition which later if recycled in form of mulch or compost for landscaping and agricultural purposes.

Recovery of Energy:- Waste materials can directly be combusted for the generation of energy as fuel or other method, indirect combustion can also be adopted for energy generation. boilers.

Reduction and Avoidance Methods:- Another method for the management of the waste material is the avoidance for it being created and this method is generally named as “waste reduction”. The avoidance for waste production includes using the second-hand product and repairing the products you have broken in place of buying new things..

Importance of waste management

The most **important** reason for **waste collection** is the protection of the environment and the health of the population. Rubbish and **waste** can cause air and water pollution. Rotting garbage is also known to produce harmful gases that mix with the air and can cause breathing problems in people.

Noise management

Noise is unwanted sound judged to be unpleasant, loud or disruptive to hearing. From a physics standpoint, **noise** is indistinguishable from sound, as both are vibrations through a medium, such as air or water. The difference arises when the brain receives and perceives a sound.

Intermediation noise

Inter modulation (IM) effects result when two or more signals pass through a nonlinear device or medium and interact with each other in ways that produce additional signals, such as harmonics and sub harmonics of input signal frequencies..

Acoustic noise

All these types of electronic noise above are distinct from acoustic noise, which encompasses sounds in an environment, including:

- Continuous noise that's steady in tone and volume, such as noise created by some machinery in industrial environments, like conveyor belts or worm gears moving materials along a production line; and retail environments, such as vent fans in a restaurant kitchen; as well as by things like fluorescent lighting -- the 60-cycle hum -- and air-conditioning in all kinds of environments.
- Low-frequency noise, also called infrasound, which is below the range of sounds normally audible to humans -- i.e., at or below about 20 hertz -- but which can be very disturbing to many people. Infrasound can be generated by machinery, and even by the vibration of buildings in response to wind or other forces.
- Workplace noise, variable in volume and tone, such as what's typically heard in the background in call centers and open-plan offices, or is experienced by workers in factories, kitchens and other environments -- often in addition to continuous noise.

Environmental noise

Environmental noise is the accumulation of all noise present in a specified environment. The principal sources of environmental noise are surface motor vehicles, aircraft, trains and industrial sources..

There are a variety of mitigation strategies and controls available to reduce sound levels including source intensity reduction, land-use planning strategies, noise barriers and sound baffles, time of day use regimens, vehicle operational controls and architectural acoustics design measures.

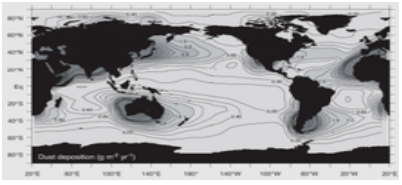
Earplugs can be used to protect the user's ears from loud noises.

Exposure to noise is associated with several negative health outcomes. Depending on duration and level of exposure, noise may cause or increase the likelihood of hearing loss, high blood pressure, ischemic heart disease, sleep disturbances, injuries, and even decreased scho performance

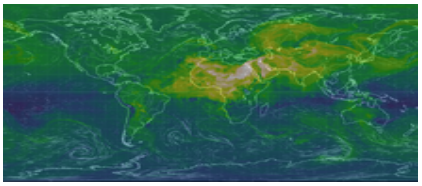
Dust Management

Dust is made of fine particles of solid matter. On Earth, it generally consists of particles in the atmosphere that come from various sources such as soil, dust lifted by wind (an Aeolian process), volcanic eruptions, and pollution.

A dust storm blankets Texas houses, April 1935



Global oceanic distribution of dust deposition



Map of dust in 2017

Domestic dust on a finger

Roads

Dust kicked up by vehicles traveling on roads may make up 33% of air pollution. Road dust consists of deposits of vehicle exhausts and industrial exhausts, particles from tire and brake wear, dust from paved roads or potholes, and dust from construction sites.

Road dust is a significant source contributing to the generation and release of particulate matter into the atmosphere. Control of road dust is a significant challenge in urban areas, and also in other locations with high levels of vehicular traffic upon unsealed roads, such as mines and landfill dumps.

Road dust may be suppressed by mechanical methods like street sweeper vehicles equipped with vacuum cleaners,[vegetable oil sprays, or with water sprayers. Improvements in automotive engineering have reduced the amount of PM10s produced by road traffic; the proportion representing re-suspension of existing particulates has increased as a result

Dust resistant surfaces

A dust resistant surface is a state of prevention against dust contamination or damage, by a design or treatment of materials and items in manufacturing or through a repair process

Self-Check -1	Written Test

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

1. ---------- is the precise name for the collection, transportation, disposal or recycling and monitoring of waste.

A/ Environment management. B/ Waste management

C/ noise management D/ Dust management

2. Which of the following is the method of damping waste

A/ **Landfill** **B/ Incineration** **C/ Recycling** **D/ All are correct**

3. Which of the following is the principal source of environmental noise?

A/ surface motor vehicles, B/ aircraft, C/ trains D/ All

4. Define what work instruction means an how it defers from procedure

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-2	Reading and interpreting job specifications

1.1. 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.

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.

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**: - 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**: - 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**: - 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**: - 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 -2	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.
2. ---------- is a written statement of educational qualifications, specific qualities, level of experience, physical, emotional, technical and communication skills required to perform a job.
   A/ Job instruction B/ Job specification C/ Work instruction D/ Job manual

Match Column "A" with Column "B"

Column "A"	Column "B"
_____3. Capacity to use or operate machines, tools, equipment etc	A/ Emotional and social specifications
_____ 4. Play an important role in selecting candidates for higher-level jobs in the organizational hierarchy	B/ Physical specifications
	C/ Behavioral Specifications
_____5. More important for the post of managers,. supervisors, foremen etc	
_____6. 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-3	Observing **Workplace Health and Safety (WHS)** requirements,

1.3. 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.

1.3.1. 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



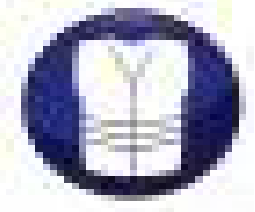
- Safety Sign for breathing protection: *it emphasized to wear breathing protection ppe such as disposable filtering face piece or respirator, half or full-face respirator, air-fed helmets, or any breathing apparatus.*

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

1.3.2. 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.

1.3.3. Workplace environment and safety

What is Workplace Safety?

Workplace safety is the concept that employers must control recognized hazards in the workplace. This doesn't mean that a place of employment is completely free of any and all dangers, but rather that it offers an acceptable level of risk for all workers.

Creating a safe work environment can include such actions as:

- Storing chemicals properly and keeping an MSDA sheet handy
- Requiring that spills be mopped up immediately
- Not allowing boxes to be stacked overly high
- Providing protective clothing for employees
- Holding training classes

Ways to create a positive and safe work environment

We all want to work in a pleasant and comfortable environment. Working in a positive and safe workplace will impact your well-being in a good way and give you a better outlook on your career.

1. **Get your team to show appreciation for each other**
   One easy and rewarding thing you can do to create a positive working environment is to actively show appreciation for your team, and encourage them to show appreciation for each other.

2. **Make space for equal and open discussions**
   The workplace should be the perfect place for open discussion. Discussion sessions can be a great opportunity for brainstorming and generating new ideas.

3. **Learn about different personality types**
   If you find that there are some tensions between team members in the group, you should tackle this proactively. Usually, any tensions between members are down to lack of communication and different personalities. Therefore, you will want to consider holding a workshop or presentation that looks at different types of personalities.. A team that understands each other will definitely have a positive impact on your working environment.
4. **Celebrate team wins**
   A team that celebrates together stays together.

5. Spend time together not working

Your employees are human, not resources or man-hours. Take some time to do a non-work related activity together. If your team feels relaxed and comfortable in each other's presence, this will create a positive and safe working environment.

6. Use anonymity where appropriate

You can create a safe discussion environment by using anonymity where appropriate.

7. Reflect back on the week together

Take time to reflect on what you and your team have achieved during the week.

8. Trust your team

As a leader, it is essential that you trust your team. Avoid micromanagement, or taking over tasks that others should be responsible for as this will cause your team to harbor negative feelings..

9. Set boundaries and expectations together

Create a positive and safe environment together by conducting a workshop where your team can set boundaries and expectations together.

Creating a positive and safe environment in the workplace is important for the well being of you and your team and it can be easily implemented and managed. Try some of these tips and see if you feel a difference

1.3.4. 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.

1.3.5. 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.

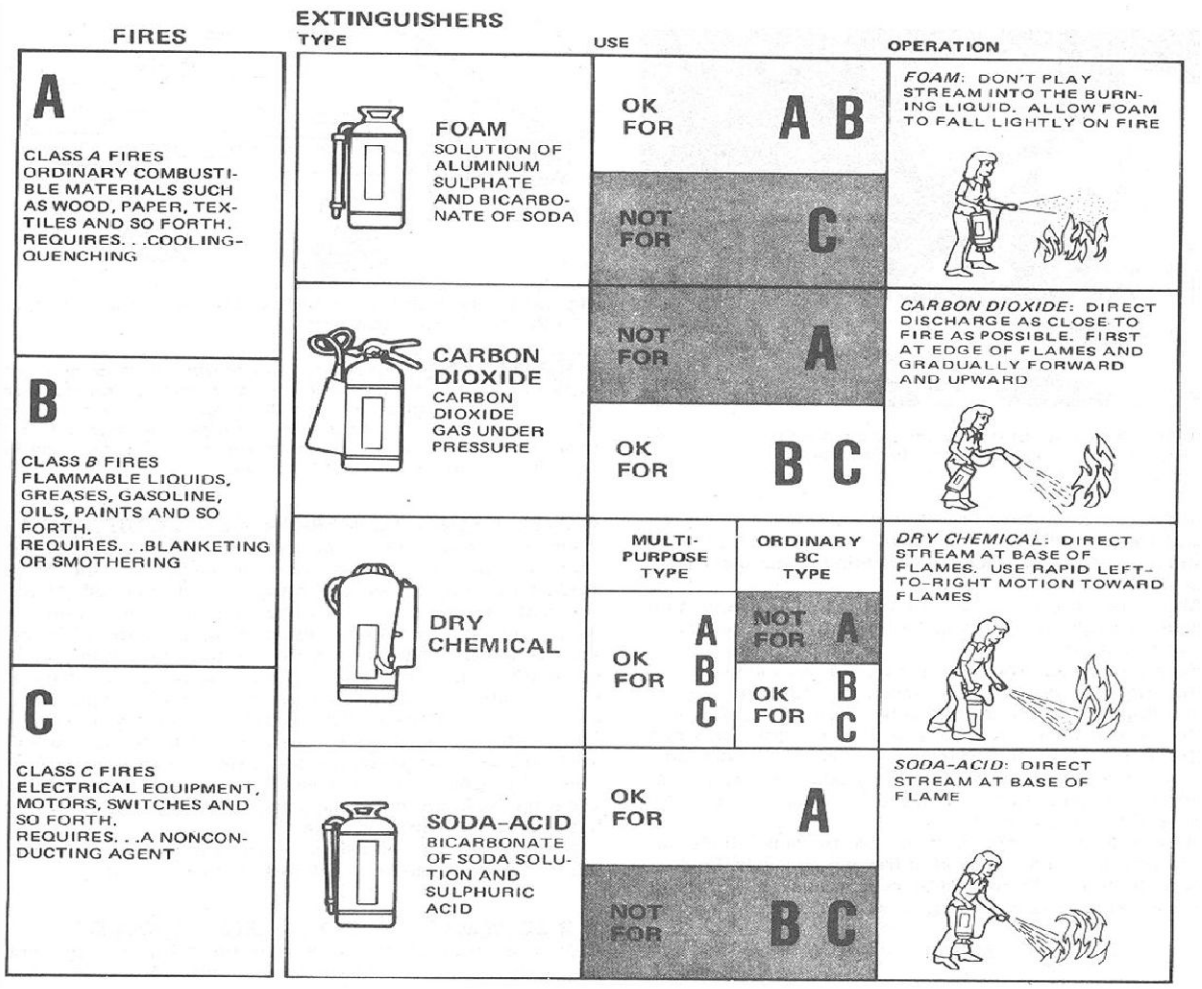
Never store gasoline in a glass container. They could break and could cause an explosion and fire. Oily rags can also be a source of fire. They can catch fire without a spark or flame. Oily rags and waste should be put into a special safety container where they can do no harm

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



1.3.6. Enterprise first aid

First aid" is a catch-all phrase that refers to two distinctly different medical needs. Emergency first aid is exactly that—the first response to a life-threatening (or limb-threatening) medical emergency, either an illness or an injury. It's often called first responder training

The aims and objectives of first aid

The objectives of first aid, is just that, to provide the “first aid” to a person who has been injured. In may cases, such as a scraped knee, a small cut, or minor illness, that is all the aid that a person needs. In more severe cases, the first aid is meant to stabilize the person until better, trained and equipped providers arrive. An example is CPR, the first aider starts CPR and the rescue squad shows up and provides care beyond the training of the first aider such as medications, airway adjuncts and IV’s.

- Preserve life.
- Prevent illness or injury from becoming worse.
- Relieve pa

1.3.7. 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 -3	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 - -- points** **Unsatisfactory - below -- points**

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-4	Selecting and inspecting materials

1.4. Selecting and inspecting materials

Corrosion resistance coatings:-

- Corrosion resistant primer systems

  Verify that primers are designed and ordered in the correct orientation. Primers for PCR/ Polymerase Chain Reaction and sequencing should be between 18 to 25 nucleotides in length. Primers for PCR and sequencing should have content between 40 to 60 percent with the 3 of a primer ending in C or G to promote binding.

Corrosion resistant primer systems Includes:-

- Epoxy primer:- produce good surface finish
  Refers to sealer that is non porous finish. Its bounding capacity is excellent and produces a good surface finish.
- Self etching primer: - Provides excellent adhesion on steel aluminium and stainless steel.
- Wash primer:- is a synthetic primer that usually contains zinc chromate or phosphoric acid. it is used as a first coat on metal surface and has anticorrosion properties.
- Weld through primer

- Anti corrosion compounds.

The coatings must be designed for automotive use, and comply with all VOC regulations.

Use one paint system throughout the repair. Do not intermix products from more than one paint maker during the repair process.

The use of these anti-corrosion compounds is included in this procedure:-

- Wax based coatings.
- Petroleum based coatings

Anti-corrosion compounds must have these characteristics:-

- Proper viscosity to form a spray fog when applied at 16 C (60 F) or higher
- Ability to penetrate pinch welds

- Ability to flow to completely coat hard to reach areas.
- no lingering odor
- Ability to bond to bare metal ,primer, and painted surfaces.
- Resistance to damage by water, oil, fuel, chips, road salt and chemicals.
- Remains flexible with age.

Seam Sealers

The use of these seam sealers is included in this procedure:-

- Self leveling
- Thin bodied
- Heavy bodied
- Solid
- Brushable
- Sprayable

Seam sealers, depending on the application, must have these characteristics:-

- Bond well to primed or painted surfaces.
- Remains flexible
- Paintable
- Resistance to oil, fuel and other fluids
- Resistance to heat from engine and exhaust system.

All seam sealers used must match the function and appearance of the vehicle maker's

Self-Check -4	Written Test

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

1. Depending on the application, which of the following is a characteristics that seam sealers must have?

   A/ Bond well to primed or painted surfaces. B/Remains flexible

   C/ Paintable D/ All correct

2. **List the four corrosion resistant primer systems.**

3. Among those about 7/seven characteristics of anti-corrosion compounds must have list at list five of them

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-5	Identifying and checking hand, power tooling and safety equipment

1.5. Identifying and checking hand, power tooling and safety equipment

Hand tools:-

Rust remover. Grease and wax **remover**, Sander, Sanding discs, Rust up paint pens remover

Power tools:- Spray gun, Air Compressor, etc

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 -5	Written Test

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

1/ Among those **important hand and power tools used in an auto body application of rust prevention and sound deadening materials , list at least 4/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-6	Determining procedures to minimize waste material

1.6. 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 -6	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**

1. 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-7	Identifying procedures to maximizing energy efficiency

1.7. 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 -7	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
- https://www .facts-meaning-safety-workplace-
- https://www.whats-environmental-occupational-safety-and-health

VEHICLE BODY REPAIRING AND PAINTING

Level II

Learning Guide # 20

Unit of Competence: - Apply Rust Prevention and Sound Deadening Materials

Module Title: Applying Rust Prevention and Sound Deadening Materials

LG Code: EIS VRP2 M07 LO2-LG-20

TTLM Code: EIS VRP2 TTLM 0919 v1

LO 2: Prepare surfaces for rust prevention and sound deadening materials

Instruction Sheet	Learning Guide # 20

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

- Clean and dry surfaces
- Prepare surfaces
- Carry out preparation activities

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 –**

- Clean and dry surfaces to enable the ***rust prevention and sound deadening*** material to adhere
- Prepare surfaces without causing damage to component or system
- Carry out preparation activities 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 16**.
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 48**
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. 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 53**
13. If you earned a satisfactory evaluation proceed to “Operation Sheet 1” **in page 54** However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
14. Read the “Operation Sheet 1” and try to understand the procedures discussed.
15. If you earned a satisfactory evaluation proceed to “Operation Sheet 2” **in page 55.** However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
16. Read the “Operation Sheet 2” and try to understand the procedures discussed.

Do the “LAP test” **in page 56** (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	Cleaning and drying surfaces to enable the rust prevention and sound deadening material to adhere.

2.1. Cleaning and drying surfaces

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

d. Wash he surface and allow to dry.

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

2.1.1. Rust prevention and sound deadening materials

2.1.1.1. Spray-on sound deadening materials

Moto spray spray on Sound Deadener is a quick drying, textured and flexible underbody protecting Schultz.

Sound deadener provides sound deadening and protection against corrosion, dust, moisture, stone chips and abrasion. May be used under wheel arches, on underbody panels, insides of guards, quarter panels and doors; also floor pans and luggage compartments.

Properties: - Colour – black, Textured finish, Flexible, Quick drying

2.1.1.2. Mechanically fastened sound deadening materials

Noise control was one of the major requirements to improve the living environment. One of the methods to do that is provided by sound absorber. Commonly, multi-layer sound absorbers are applied to absorb broadband noise that was composed of perforated plates, air space and porous material

Car boot liners made from woven cotton cloth were used as type of porous layer in the study. This material has been used widely in automotive industry. Perforated plate used was machined with perforation ratio of 0.20, thickness of 1 mm and holed diameter of 2 mm.

The optimum value for coconut coir fibber with perforated panel is around 0.94-0.95 for the frequency range 2600-2700 Hz. Conclusion: Noise absorption coefficient of coconut coir fiber was increased at all frequency when they were backing with Woven Cotton Cloth (WCC).

At low frequency, the NAC have significant increasing. This is because WCC have higher flow resistivity than coconut coir fibbers; so that sound can be dissipated as it travels through material significantly. By using the porous layer and perforated plate backing to coconut coir fibber, the sound absorber panel shows a good potential to be an environmentally friendly product. This innovative sound absorption panel has a bright future because they are cheaper, lighter and environmentally compare to glass fibber and mineral based synthetic materials.

2.1.1.3. Under-body sealers

Under seal (often called undercoating in the U.S.) is a thick resilient coating applied to the under body or chassis of an automobile to protect against impact damage from small stones, which would rapidly chip ordinary paint, allowing rusting to begin.

Vehicles for sale in some territories are not under sealed, because the climate is not sufficiently aggressive to warrant it. If such a vehicle is subsequently imported into a country with high rainfall, cold winters and where salting of the roads is common, application of under-seal is strongly recommended to ensure the vehicle has a long life.

Sealers and Rust Proofing Materials

The term sealer covers a wide variety of materials used in the motor industry for sealing against water and dust, from products which remain virtually mastic throughout their life to others which harden up but still retain some measure of elasticity. They range from mixtures of inert fillers and semi-drying oils, to heat-curing plastisols which may be applied in a thin paste to form as an inter weld sealer or as extruded beads.

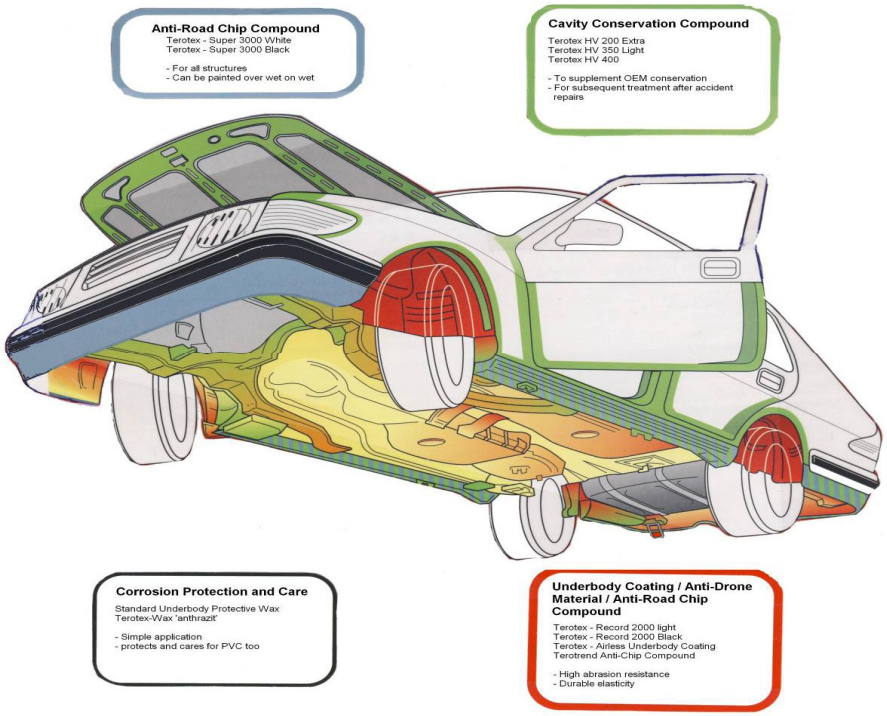
Sealing compounds can be categorized into the following general groups:

- Oil based compositions,
- Rubber based compositions, and
- Synthetic resin based compositions, where the choice of each of the types will be dependent on the site for application, the eventual conditions of exposure and often on price.

These categories can be subdivided further into the various physical forms in which they can be made available, which include

- Mastic putties for hand application,
- Extruded sections for placing in precise locations,
- Grade trade compositions which have the advantage of speed and economy of application, pouring and spraying grades.

The properties of sealers will obviously vary according to their type and to their application; thus performed strip or putty sealers must adhere to the surfaces to which they are applied, and must not harden or crumble in service; glazing sealers must be capable of being readily applied from a gun, with the ability to harden off on the surface, but must remain mastic in the assembly so that they are capable of maintaining a leak-tight joint whatever deflection the body undergoes. Heat gelling sealers must be capable of being readily applied by extrusion or possibly by spraying and then must set up when cured but still retain a degree of flexibility.



2.1.1.4. Joint and seam sealants

Seam Sealing is the process of treating the stitch holes and **seams** in gear made from waterproof fabric to prevent them from leaking when it rains or snows to achieve maximum water proofness.

Dynatron **Seam Sealer** is a fast-skinning, permanently elastic, non-sagging formulation that is brushable and paintable. Provides excellent adhesion to bare metal or painted surfaces and is a non-staining, all-purpose **auto body** joint and **seam sealer**.

In sewing, a seam is the join where two or more layers of fabric, leather, or other materials are held together with stitches. Prior to the invention of the sewing machine, all sewing was done by hand.

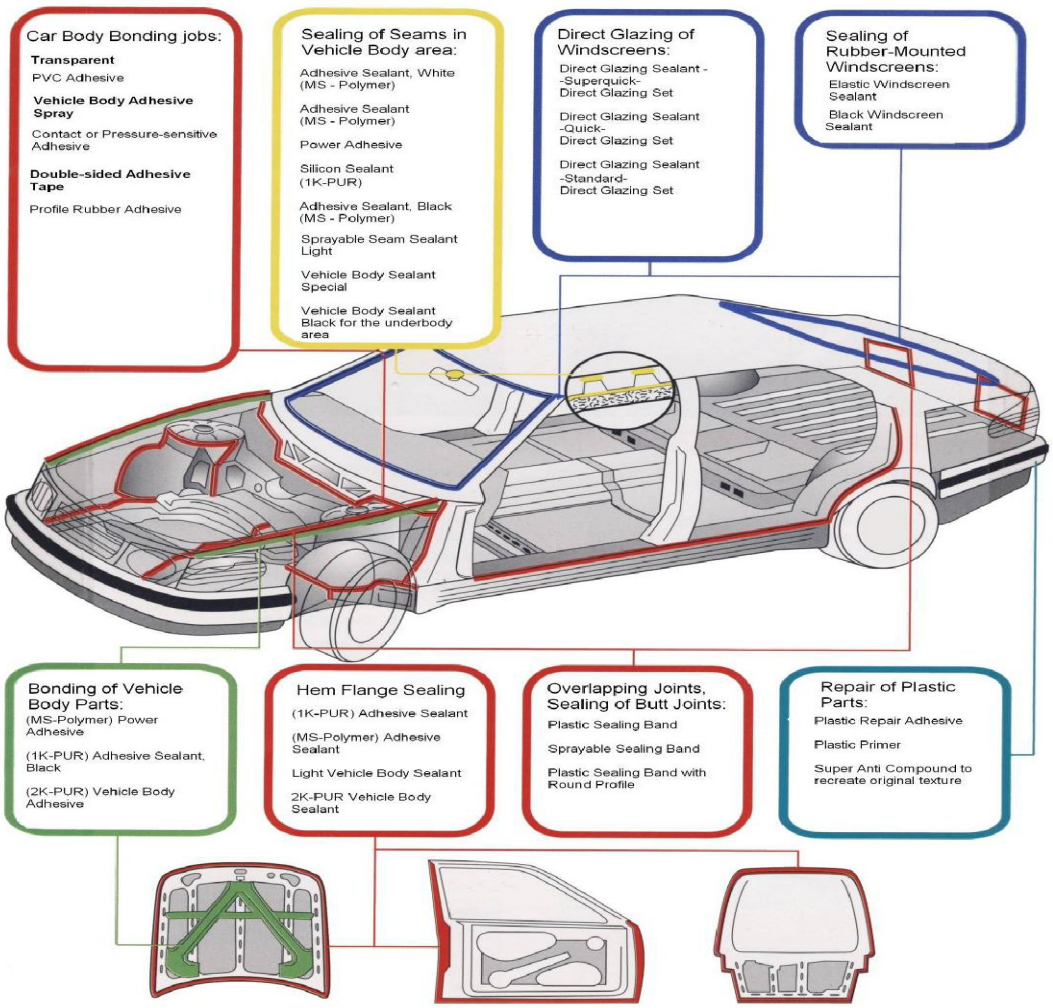


Figure 1: Sealers and Rust Proofing Materials

2.1.1.5. Paint protection, rust protection and upholstery protection

Paint protection

What is car paint protection?

Paint protection is essentially an invisible coating that is applied over the car's paintwork and serves as a protective layer. The idea is to shield the paint from damage that may come from stones, bird droppings and even fading. However, it won't protect from bigger dents and scrapes. Not all car paint protection is created the same, and there are several different types on the market, which is why it is important to do your research.

Different types of paint protection

The two most common types of paint protection are **paint protection film** and **ceramic paint protection**. While the latter is newer to the market, both types have different strengths when it comes to usage.

Paint protection film – also referred to as clear bra, the paint protection film is a clear urethane film that is either applied to high-impact areas of your car, such as the front bumper, the bonnet, rocker panels, or to the whole car. The idea is to avoid any risk of stone chips and other objects damaging the paintwork. Brands such as the brand we use, XPEL offer 'self-healing' capabilities, which means light scratches will form back to clear and protect the paint beneath it.

Ceramic paint protection – also referred to as nano-coatings, ceramic paint protection requires more preparation than traditional waxes or sealants. A thin layer is applied to the car, which forms a chemical bond that can only be removed through abrasion. The ceramic coatings are resistant to UV rays and chemicals, as well as stone chips and other debris. For ceramic paint protection we use an recommend Gyeon Quartz coatings.

Paint protection can help in all these areas and can be invaluable when it comes to the general upkeep of your car and keeping it in the best condition possible. There are so many benefits that come with getting paint protection for your car, which makes it something worth considering. These include:

1. **Protection against rock chips:** these generally appear along the front of the car or in the wheel arch and are caused by driving over gravel and other small debris.
2. **Protection against bird droppings:** it's is an inevitable that you can't avoid, which not only leaves your car looking messy but can cause permanent marks because if its acidity.
3. **Protection from UV rays:** these can have a harsh effect on your car paint. It can cause it to oxidise or fade.
4. **Oxidation and corrosion resistant:** bare metal can tend to oxidise; however, painted surfaces are less likely to.
5. **Low maintenance:** one of the best parts about getting paint protection is that it is a great, low-maintenance way of keeping your car looking like new for longer.
6. **Increases your car's resale value:** when it comes to selling your car, the exterior is one of the areas that will be examined for any marks and scuffs and how the paint is looking. Any imperfections will bring down the cost of your car..

What is the difference between ceramic paint protection and film paint protection?

While ceramic paint protection and film paint protection have many similarities, which are noted in the benefits above, they also serve different purposes, which is worth taking into consideration when choosing which one to go with.

Paint protection film is thicker than its counterpart and can 'self-heal', which means it can return to its original form after an abrasion. This means any rock chips, debris, water spots and other small scratches won't cause any lasting damage to the car and will disappear.

The strength of the **ceramic paint protection** lies in its hydrophobic surface, which substantially prevents dust and water from attaching to the surface. Unlike other types of paint protection, ceramic paint protection also offers a permanent adhesion to the paint, which won't come off with chemicals. It scores above 9H on the Pencil test scale, which is the highest level used in the coating industry. It also offers gloss and shine with little to no maintenance, helping your car remain as glossy and shiny as the day you bought it and reducing your need to polish.

Rust protection

Corrosion or rust, when it occurs on steel is the product of a complex chemical reaction with series and costy consequences.

Chemical corrosion requires three elements

- Exposed metal
- Oxygen
- Moisture (electrolyte)

There are three basic types of corrosion protection used on to days automobile

- Galvanizing or zinc coating
- Paint
- Anti corrosion compounds

1. Galvanizing to the process of coating steel with zinc.

It is one of the principal methods of corrosion protection applied during the manufacturing process. On galvanized steel, the zinc forms a natural barrier between the steel and the atmosphere. As the zinc corrodes a layer of zinc oxide will form on the surface exposed to the atmosphere. Unlike iron oxide, or rust the zinc oxide adheres to the zinc coating tightly forming a natural barriers between the zinc and the atmosphere. When the surface of the cars finish is damaged by a scratch or nick, the zinc coating under goes corrosion, scarifying itself to protect the iron under it. The resulting zinc oxide actually forms a protecting coating and repairs the exposed area of the steel. Thus zinc performs a two fold protective process; first it provides chemical galvanic protection and second it forms a repair over the exposed steel with a layer of zinc oxide.

2. A paint system:-

Paint provides a barrier between the atmosphere and the steel surface. When this barrier is in place, the moisture and impurities in the air can not interact with the steel surface and the steel is protected from corrosion.

3. Anti corrosion compounds

Anticorrosion compounds are additional coatings applied over the paint film. Protective coatings can be applied either by the manufactures or as an after market process. The two most popular types of anticorrosion coatings are:

- Petroleum – based compounds
- Wax- based compounds

Precautions that should be taken to protect the factory corrosion protection are:

- Remove only the minimum amount of paint film from affected areas such as welded points.
- Be extremely careful not to scratch any part except that to be repaired. If there is an accidental scratch, take necessary remedial measures.
- When clamping or holding the affected panels during body repair work, clamping can cause scratches on the panels. They must be treated to avoid rusting.
- While grinding cutting or welding panels, replace protective covers over adjacent painted surfaces and surrounding areas to protect them from the flame or metal chips.
- Completely remove any metal chips from inside the body. Use a vacuum cleaner not to dry compressed air, to remove metal chips. If dry compressed air is used, metal chips can be flown out and accumulate in corner areas.

Anticorrosion materials or agents can be divided in to three broad categories.

- **Anticorrosion compounds**:- Either wax or petroleum based compounds are resistant to chipping and abrasion, they can undercoat, sound leaden and completely seal the surface of a car from the destructive causes of rust and corrosion. They should be applied to the under carriage and inside body panels so that they can penetrate in to joints and body crevices to form a pliable, protective film.
- **Body sealer or sealant**:- This prevents the penetration of water or mud in to panel joints and serve the important role of preventing rust from forming between adjoining surfaces.

- **Antirust agents**: They are used where it is difficult get unit corrosion material coverage. This includes such areas as the back sides of welded parts with boxed cross sectional structures such as side members and body pillars that can not be painted.

Upholstery protection

The most important thing you can do to keep any **upholstered** furniture looking its best is to vacuum regularly, preventing surface dust from settling into the fabric. For **velvet**, use the small brush attachment of your vacuum and run it in the direction of the nap.

Method 1 Stain-Proofing Car Seats

1. Empty your car. Clear all trash and debris from your seats as you prepare to give them a nice once-over. ...
2. Vacuum your car seats. ...
3. Place towels on the trim of your car. ...
4. Open all doors and windows in your car. ...
5. Spray down your car seats with an upholstery protector

For velvet drapery or pillow covers, dry-clean regularly. In between cleanings, use a soft-bristle brush to dust and remove fuzz. For spills or stains, follow our tips below. If you prefer to switch out your velvet drapery in the warmer months, keep them dust-free by hanging them in a breathable covering away from light and moisture.

The dry-cleaning option obviously goes out the window with upholstered furniture. The most important thing you can do to keep any upholstered furniture looking its best is to vacuum regularly, preventing surface dust from settling into the fabric. For velvet, use the small brush attachment of your vacuum and run it in the direction of the nap. If you fear your attachment is not very clean, wrap it in cheesecloth and secure with a rubber band to protect your velvet upholstery.

Stains & Spills

Any spills should be treated as quickly as possible by gently pressing a white absorbent cloth or paper towel over the spill. Slightly moistening the cloth with lukewarm water may help as well.

For more persistent stains, there are a couple of solutions you can try. The first requires mixing a few drops of dishwashing detergent with a small amount of warm water in a bowl. Agitate the solution until suds fill the top of the bowl. Using a soft white cloth, apply

only the suds to the stained area, taking care to not over wet the fabric. Lightly dab the stain until it starts to fade. Blot with a clean cloth to remove the remaining stain and any residue from the suds. Allow the area to dry completely, using a hair dryer on its lowest setting if necessary.

If that doesn't do the trick, it's time to use a dry cleaning solvent. Follow the directions on the packaging to dilute the solution. Apply a small amount on a clean cloth – never directly on the fabric – and lightly dab into the stain just as you did with the suds mixture. Use a damp, clean cloth to remove any residual shampoo. Let it dry completely.

Self-Check -1	Written Test

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

1. ***----------*** *is* a quick drying, textured and flexible underbody protecting Schultz. ***A/*** Spray on sound deadener. B/ Rust remover C/ Power Sander D/ Reducer

2. List the three category general groups of sealing compounds.

3. Define what an under-body sealers (under-seal) means.

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-2	Preparing surfaces

2.2. Preparing surfaces

Surface preparation is the process of treating the **surface** of a substance in order to increase its adhesion to coatings. The single most important function that influences coating performance is the quality of **surface preparation**.

Surface Preparation

1. Remove all surface dirt with a wire brush, and wipe over with *PREPWASH* ensuring that surface is clean, dry and dust free.
2. Remove any rust by grinding off or sanding then treat the area with *deoxidizer & rust remover.* Alternatively treat rust with *moto-spray rust converter and primer sealer*.

Exterior Corrosion protection

To preserve existing corrosion protection while making repairs:-

- Remove only a minimum amount of paint film from damaged areas.
- avoid removing any zinc coating
- Do not remove E-coat unless directed by the vehicle maker.
- Avoid scratching any part. if there is an accidental scratch, restore corrosion protection to the area.
- Protect undamaged areas from grinding, and welding.
- Cover openings in the body to prevent metal chips entering during grinding, cutting, or welding.

Self-Check -2	Written Test

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

1. The process of treating the **surface** of a substance in order to increase its adhesion to coatings is known as :- ----------

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-3	Carrying out preparation activities

Surface preparation methods prior to coating

Proper preparation of the metal surface plays an influential role in the lifetime of the coating, and includes a wide variety of methods and procedures that may involve grit blasting, mechanical removal of rust, or the use of rust remover. These countermeasures can be used individually or synergistically in the practices of managing the corrosive effects of deicers to motor vehicles and winter maintenance application equipment. A recently developed method is the use of rust convertors. Rust converters are designed to Convert existing rust into a protective coating that blocks moisture and prevents future corrosion problems.

Important practical points

Use of salt remover (rust remover) effectively increases coating performance (Peters, 2003) (Additional information on rust removers can be found in section 46

Washing.

Grit blasting is the best method of surface preparation (Figure 38). However, in situations where grit blasting is prohibited or unusable for safety and environmental reasons; rust removers should be used for surface preparation prior to coating (Sharman, 2009).

In maintenance environments, rust removers should be used for surface preparation prior to coating; instead of traditional hand and mechanical wire brush (Sharman, 2009).

In the rusted surfaces, rust converters could be applied to the metal surface as a primer coat supplemented with oil based or epoxy paint (Collazo et al., 2008; Shi et al., 2013).

Rust converters are not suitable for damaged coatings (Caseres, 2009).

Rust converters containing copper compounds accelerate oxidation and have negative effects (Collazo et al., 2010).

The majority of rust converters are made from tannic acid or phosphoric acid, or a mixture of both (Barrero et al., 2001). Well-performing rust converters consist of isopropanol and tertbutanol (Barrero et al., 2001). A combination of tertbutyl and iso

propyl alcohol can be used to accelerate the efficiency of rust convertors (Bolivar et al., 2003). A report by Caseres (2009) provides a review of these specific products.

Proper corrosion protection and sealing repair procedures

- A two part epoxy primer was applied to the metal surfaces during the latter part of the repair. For closed sections, such as front and rear rails, rocker panels and pillars, the primer is applied without applying the metal conditioner and the conversion coating. These steps are omitted to insure that no rinse water is trapped in the closed sections.

- The primer application in followed by an application of an oil or wax based rust proofing material.
- After the corrosion restoration process for the closed sections are completed, then the process can be applied to all exterior sections. For exterior surfaces, both metal conditioner and conversion coating treatments are applied to the exterior surface prior to application of the epoxy primer.
- Appropriate seam sealers are then applied to all joints. Follow manufacturer's recommendations for the appropriate type of seam sealer to be used at each seam or joint.
  Important: when replacing welded parts, all hollow sections are to be treated with wax as recommended by the manufacturer point and seam sealants

Applying the following rust prevention and sound deadening materials to different vehicle body components:

1. Fish oil.
2. Wax compounds.
3. Spray-on **sound deadening**.
4. Brush-on **sound deadening**.
5. Adhesive bonded **sound deadening** pads.
6. Joint and seam sealants.
7. Sealers and Rust Proofing Materials and
8. Manufacturers Rust Proofing Coatings

Self-Check -3	Written Test

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

1. Among those rust prevention and sound deadening materials , list at least 5/ five of them

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet 1	Cleaning and drying surfaces

Procedures of Cleaning and drying surfaces

Steps:-

1. **Wash the car.** Focus on deep cleaning the area where the paint is chipped. Use car washing soap, water, and a clean, soft cloth to clean the scratched area.
2. Be sure to thoroughly dry the area that is scratched after you wash it
3. **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

4. **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..

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

   Use a small piece of sandpaper to sand all around the scratch.

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

6. Wash the surface and allow to dry.

Operation Sheet 2	Corrosion protection and sealing repair procedures

Procedures for Proper corrosion protection and sealing repair

1. A two part epoxy primer was applied to the metal surfaces during the latter part of the repair.
    - For closed sections, such as front and rear rails, rocker panels and pillars, the primer is applied without applying the metal conditioner and the conversion coating. These steps are omitted to insure that no rinse water is trapped in the closed sections.

2. The primer application is followed by an application of oil or wax based rust proofing material.
3. After the corrosion restoration process for the closed sections are completed, then the process can be applied to all exterior sections.
    - For exterior surfaces, both metal conditioner and conversion coating treatments are applied to the exterior surface prior to application of the epoxy primer.
4. Appropriate seam sealers are then applied to all joints.
    - Follow manufacturer's recommendations for the appropriate type of seam sealer to be used at each seam or joint.

    Important: when replacing welded parts, all hollow sections are to be treated with wax as recommended by the manufacturer point and seam sealants

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. Clean and dry surfaces

Task 2. Repair sealing and corrosion protection

List of Reference Materials

https://www.colliermiller.com.au/documents

https://www.do-new-cars-need-paint-protection

https://www.howtodecorate how-to-care-for-velvet

https://www.Protect-Cloth-Car-Seats

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 # 21

Unit of Competence: - Apply Rust Prevention and Sound Deadening Materials

Module Title: Applying Rust Prevention and Sound Deadening Materials

LG Code: EIS VRP2 M07 LO3-LG-21

TTLM Code: EIS VRP2 TTLM 0919 v1

LO 3: Apply special treatments and/or materials

Instruction Sheet	Learning Guide # 21

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

- Applying special treatments or material
- Drying special treatments or materials
- Completing application of special treatments or materials
- Fastening finished products meet with specification
- Carrying out application activities

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 –**

- Conform the environment for the application of special treatments or material requirements for temperature, extraction of fumes and cleanliness
- Apply special treatments and/or materials as per manufacturer/component supplier recommendations.
- Dry special treatments or materials using approved ***methods*** and equipment, as necessary
- Complete application without causing damage to component or system
- Complete application of special treatments or materials within established industry guidelines

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 23.
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 63-.**
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 **70**.
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 72**.
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 74
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 77**
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. If you earned a satisfactory evaluation proceed to “Operation Sheet 1” **in page 78**. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
19. Read the “Operation Sheet 1” and try to understand the procedures discussed.
20. If you earned a satisfactory evaluation proceed to “Operation Sheet 2” **in page 79**. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
21. Read the “Operation Sheet 2” and try to understand the procedures discussed.
22. If you earned a satisfactory evaluation proceed to “Operation Sheet 3” **in page 80**. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
23. Read the “Operation Sheet 3” and try to understand the procedures discussed.

Do the “LAP test” **in page 81** (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	Applying special treatments or material

3.1. Applying special treatments or material

Treatment of bare metal surfaces

If a primer will be used that does not require metal conditioner and conversion coating, apply under coats following the painter recommendations.

To treat bare surface:-

1. Clean the repair area with the proper wax and grease remover and wipe dry.
1. Apply metal conditioner and conversion coating, as required. following the paint maker recommendations
2. Apply undercoats. Metal conditioner and conversion coating are not recommended for weld areas and for application inside enclosed areas after assembly.

Trea**tment of Weld Areas**:-

To treat bare surface:-

1. Before welding, clean the mating surfaces. Avoid any zinc coating.
2. Clean the mating surfaces and inside section of enclosed parts with the proper wax and grease remover.
3. Apply weld through primer to mating surfaces.
4. After welding, remove all welding residues.
5. Dress exposed welds on cosmetic surfaces.
6. Apply a self- etching, wash or epoxy primer.
7. Treat exposed seals.
8. Apply topcoat to cosmetic areas.

Treatment of enclosed Parts

To treat enclosed parts, such as rails, rocker panels and pillars:-

1. Clean the panels with the proper wax and grease remover before assembly
2. apply metal conditioner and conversion coating before assembly
3. Prepare the weld surface
4. Set the spray pattern for the primer by adjusting the pressure
5. Apply corrosion resistant primer inside the enclosed area.
6. Clear all drain holes after application
7. Treat exposed seams.
8. Apply anti corrosion compounds

Treatment of Exposed seams

To treat exposed seams:-

- Thoroughly clean the joint areas
- Apply corrosion resistant primer to the joint areas and allow to dry
- Apply an appropriate seam sealers to the expose seams
- apply primer to the exposed areas
- Apply topcoat to the exposed areas

Self-Check -1	Written Test

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

1/ From the different treatment parts of **bare metal surfaces, list the steps to** treat the enclosed parts, such as rails, rocker panels and pillars

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-2	Drying special treatments or materials using approved ***methods*** and equipment,

3.2. Drying special treatments or materials

3.2.1. Methods of drying

3.2.1.1. Spray gun/heat gun techniques

When painting in cold weather, always follow the manufacturer's recommendations. Most traditional latex-based paints won't cure at temperatures below 60 degrees Fahrenheit (15.6 degrees Celsius). If you paint in colder weather, the paint may change colors, "blush or "bloom" (appear milky, blotchy or cloudy), lose its glossiness in some areas, run or drip.

- Keep in mind that even if the weather is warmer than 60 degrees Fahrenheit (15.6 degrees Celsius) when you're painting, the temperature will drop and dew will form once the sun goes down. If the paint isn't dry when the temperature drops, the paint will stop curing and when dew forms, moisture will get into the paint. This can shorten the life expectancy of the paint and cause adhesion problems, surface leaching or mildew growth.
- While the temperature should ideally be within the manufacturer's suggested temperature range for 48 hours after painting, most alkyd- and latex- based paints require a minimum of four hours to dry before allowing moisture to settle on the surface; consequently, be sure to stop painting early enough in the day to allow sufficient drying time before dark. Other helpful tips include keeping your paint in a warm room so it won't be cold when you start painting and warming the painting surface before you begin.
- If you absolutely must paint in cold weather, there are some paints on the market that can be used in temperatures as low as 35 degrees Fahrenheit (1.7 degrees Celsius).
  - You can also use a heat gun to systematically dry the paint.
    - ✓ Paint a small area, and then dry it with the heat gun and move on to the next area. This is tedious, and you have to be careful to dry it long enough and to use the appropriate temperature.

- ✓ Put your heat gun on a low setting of 86 to 266 degrees Fahrenheit (30 to 130 degrees Celsius) when drying paint.
- ✓ Heat guns are used on high settings for removing paint, so don't set the temperature too high! However, when at all possible, it's preferable to wait until the temperature is appropriate for painting to ensure the best quality paint job.

3.2.1.2. Drying techniques

- Keep a fan on. Multiple fans oscillating in the room will speed up the dry time considerably.
- Apply light coats. ...
- Keep the room warm. ...
- Keep the humidity down. ...
- Paint one wall at a time. ...

There are chemicals that slow down drying so one can paint longer. If you're talking about oil paints, there are many mediums that you can mix to accelerate drying times. Alkyd mediums – such as Liquin, Galkyd and Neo-Meglip increase the drying time. You can also just thin paints and they will dry faster. Use a zero-VOC* paint like ECOS Paints

3.2.1.3. Hand brushing techniques

Dry brush is a painting technique in which a paint brush that is relatively dry, but still holds paint, is used. Load is applied to a dry support such as paper or primed canvas. The resulting brush strokes have a characteristic scratchy look that lacks the smooth appearance that washes or blended paint commonly have.

The dry brush technique can be achieved with both water-based and oil-based media. With water-based media such as inks, acrylic paints, tempera paints or watercolor paints, the brush should be dry or squeezed dry of all water. The brush should then be loaded with paint that is highly viscous or thick. The loaded brush should then be applied to a dry support. With other water-based media, the brush should be loaded with paint then squeezed dry.

With oil-based media, such as oil paint, a similar technique may be used, although instead of water, the brush should be dry or squeezed dry of oil and solvent. Because oil paint has a longer drying time than water-based media, brushing over or blending dry brush strokes should be avoided to preserve the distinctive look of the dry brush technique.

The technique is frequently used in model painting to apply highlights to miniatures.

Oil-based dry brushing can also be scrubbed onto paper, canvas or absorbent gesso with stiff bristle brushes to impart smooth airbrushed or pastel-style effects. Next is that dry brush is sometimes mixed with other painting techniques

Coming from the dry brush technique, an autonomous painting technique developed in a comparatively short time:

Portrait using dry brushing technique

For painting with the dry brush a small amount of oil is used. The color is diluted with a few drops of linseed oil. From this mixture very little color is added to the brush. In the next step the brush with the color on it is spread out very well on a color palette and the oil is secreted. The brush must be dry at the end of this step.

Linseed oil, when used with oil paint for dry brushing, will yellow if it becomes too warm, such as being left in a car in the summer sun. Sewing machine oil and diesel oil work just as well and do not yellow.

Now a very thin layer of color is applied to a watercolor paper. By reworking with an eraser at this point it is possible to incorporate different lighting effects and details.

Images painted with a dry brush are characterized by the specific transitions of light and shadow and gossamer tones. A work done in black and white appears similar to a coal or fine pencil drawing

spraying techniques

How to Spray Paint like a Pro

1. Get the right products. If you're not sure what kind of paint to buy, ask someone at your local home improvement store. ...
2. Work in a well ventilated area. Outside is best. ...
3. Cover up any exposed areas. ...
4. Wear a mask and gloves. ...
5. Prep your surface. ...
6. Start with a coat of primer. ...
7. Shake well before using. ...
8. Don't spray too close or too much.

3.2.1.4. Mixing, thinning, matching and spraying techniques

Mixing

If you want to make secondary **colors**, like violet, green, or orange, **mix** red, blue, and yellow in various ratios. For example, to make violet, **mix** red and blue, and to make green, **mix** blue and yellow. To make the **color** lighter, add a drop of white to make a "tint."

Rust is an orange-red-brown **color** resembling iron oxide. It is a commonly used **color** in stage lighting, and appears roughly the same **color** as photographic safelights when used over a standard tungsten light source.

Mix in a small quantity of brown **paint** (approximately one part brown to 10 parts yellow), using the palette knife. Keep in mind that it's always easier to darken your **paint** than it is to lighten it, so start with small amounts and gradually add more until you start to achieve a **gold**-like hue.

After the tint is added, the lid is placed on the can, and the **paint** is placed in a **mixer**. Metal clamps hold the can in place, and the machine shakes the can extremely fast for several minutes. Afterward, the person on the **paint** counter opens the can and checks to make sure the **paint** is mixed thoroughly

Start with red, yellow, and blue paint—the primary **colors**. Use these to **make** secondary **colors**. Then **make** tertiary **colors by mixing** primary **colors** with the nearest secondary **colors**. (For example, you might **mix** yellow with green to **make** yellow-green, or yellow with orange to **make** yellow-orange.)

Thinning

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.

What about Oil-Based Paint?

1. Pour your paint into the container. ...
2. Add one part turpentine or mineral spirits for every three parts of paint.

3. Stir with a stick you'll never use for anything else.
4. Brush the paint onto a test surface and inspect the results.
5. Add more thinner if the paint is still too thick.

It **must** be diluted or thinned with water to achieve a better consistency. Thinning your **paint** is most important if **you** intend to distribute a **thin** mist of **paint**, or if **you are** using paint **spray** gun or nozzle. Materials which **are** too thick may find it hard to pass through the vent for the **spray** guns.

Here's what you do:

1. Pour the paint into the bucket.
2. Add ½ cup of water for every gallon of paint.
3. Mix thoroughly.
4. Check the thickness by running the paint through a funnel. If it flows freely through the funnel, you know the paint is thinned enough.

Matching

From the outside of your **vehicle**, look on the bottom right of the driver's side. This is where you'll find your VIN number, and in some cases, your **color** code
et despite these challenges, a good auto **body** painter **can match** your **factory paint**, using manufactures' **paint** codes, spray panel testing, and good old-fashioned experience. So the answer is yes, the **paint will match** if you are using a reputable **body shop**

Spraying techniques

How to Spray Paint

1. Get the right products. If you're not sure what kind of paint to buy, ask someone at your local home improvement store. ...
2. Work in a well ventilated area. Outside is best. ...
3. Cover up any exposed areas. ...
4. Wear a mask and gloves. ...
5. Prep your surface. ...
6. Start with a coat of primer. ...
7. Shake well before using. ...
8. Don't spray too close or too much.

DO NOT use spray paint, from spray cans, to paint your car... not even if the car is bare metal and rusting away to pieces. ... If you have nicks or scratches, the paint does not "fill in" the defects regardless of how many "coats" you might apply. This is a very common error.

3.2.1.5. Mechanical fastening techniques

Mechanical fastening is the most common method of joining many materials within industry. Originally used for metal joining, it is also well established for joining plastics to themselves and to other materials.

There are two main categories of industrial fasteners, **permanent and no permanent**.

Screws are examples of no permanent fasteners, since they can be removed, replaced, and reused. These parts increase the product cost due to the increased assembly time and are more difficult to handle and align.

Permanent fasteners, such as snap-fits, which are integrated into the parts through direct molding, are more robust and do not have the potential for working loose.

Screws are a reliable and inexpensive method of mechanical fastening. They do not require molded-in threads or threaded inserts, reducing molding and assembly costs. Dissimilar materials can be joined, and disassembly and reassembly of the joint is possible, often up to ten disassembly/reassembly cycles. Full-strength joints can be obtained immediately, without the cure time associated with adhesive bonding, and no special application tools are required. Screws, nuts, bolts, and washers are no permanent fasteners and materials joined in this way are disassembled and reassembled a number of times until the material being joined fails.

On top of most buildings is a metal deck, then a layer of insulation, then the roof. When installing **mechanically attached** roofs, the membrane roll is laid down and then the screws are driven directly through the insulation boards into the metal deck below.

Non structural panels such as fenders, hoods, or quarter panels can be attached with bolts, rivets, and screws, among others. Bumpers and selected hard ware are also usually bolted to the frame.

Replacing these panels requires removing the fasteners. It is simple and fast. It is a matter of bolting the new panel in place and adjusting the fit.

Here is a list of different ways to join metal without welding:

- Hardware assembly.
- Spot welding.
- Riveting.
- Brazing.
- Soldering.
- Glue

Self-Check -2	Written Test

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

1. Most alkyd- and latex –based paints require a minimum of ---------- hours to dry
2. before allowing moisture to settle on the surface

A/ 4 /four hrs B/ 6/six hrs C/ 7/seven hrs D/ 8/ eight hrs.

3. Mention those 5/five techniques of drying special treatments or materials of rust prevention

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-3	Completing application of special treatments or materials

3.3. Completing application of special treatments or materials

Inspection and Testing

Inspection of repaired areas

Inspect Repaired Areas for These Conditions:-

1. Restoration of corrosion protection in areas where clamping and anchoring devices were installed, and where metal working was performed
2. No signs of corrosion
3. Complete and even coverage of coatings
4. No dissimilar metals in contact, such as aluminum trim parts contacting a steel panel at the edge of mounting hole.
5. No overspray on mechanical or electrical parts, or cosmetic surfaces
6. Proper application of sound deadening materials to underbody surfaces inside the trunk
7. Proper dressing of welds
8. Complete sealing
9. Coated wand access holes
10. Open drain holes.
11. Correct any defects.

Self-Check -3	Written Test

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

1. Among those inspection of repaired areas, mention at least 5/five of them

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-4	Fastening finished products meet with specification

3.4. Fastening finished products meet with specification

A **product specification** (also referred to as "**product specs**") is a document with a set of requirements that provides **product** teams the information they need to build out new features or functionality. A good **product spec** doesn't micro-manage **product** development

Product specs typically contain the following elements.

- Product Summary. First, begin with a description of the product idea. ...
- Business Case. Next, you should include the business case for developing the product. ...
- User Stories. ...
- User Personas. ...
- Product Design. ...
- Functional Spec.

teps

1. Decide if the specification will be open or closed. Consider an open specification.
2. Determine requirements. Evaluate all specifications to determine if they are necessary to the product or assembly.
3. Ascertain your writing style. Use short and direct sentences. ...
4. Develop your table of contents.

Self-Check -4	Written Test

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

1. ---------- is a document with a set of requirements that provides **product** teams the information they need to build out new features or functionality

A/ Product specification B/ Product quality C/ Product outcome D/ Product analysis

2. Mention about 6/six elements that product specifications typically contain.

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-5	Carrying out application activities

3.5. Carrying out application activities

Application of anti-corrosion Compounds

To apply anti-corrosion Compounds:-

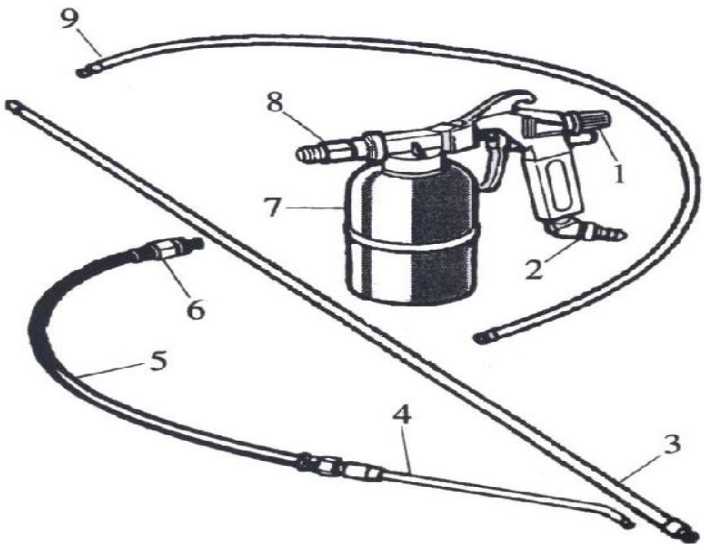
1. Adjust the pressure on the spray system for the anti-corrosion Compounds
2. Apply anti-corrosion Compounds to enclosed interior surface and underbody areas
3. Apply sound deadening materials to the underbody areas and inside the trunk
4. Repair any other damage to the existing corrosion protection coatings.

Accurately Applying Rust Proofing Materials

Wax Spray Gun Lances

Corrosion Warranty

To enhance corrosion protection following repairs the repair joints are to be treated as appropriate. Areas to be resistance spot welded are coated with spot weld primer approved by the manufacturer. In addition, the inner surfaces of MIG welded joints are treated with cavity wax material recommended by the manufacture after repair, whether this is part of the production process or not.



Application Equipment

1. Flow control (spray pattern adjustment)

2. Air inlet

3. Rigid lance (1100mm) with 360° spray pattern

4. Rigid directional hook wand (forward cone spray pattern)

5. Flexible lance

6. Lance nipple connection

7. Pressure cup – 11capacity – maximum pressure 140lbf/in2

(9.7 bar, 9.84kg/cm2)

8. Gun connector

9. Flexible nylon lance (1100mm) with 360° spray pattern

Spray Pattern of Lance Nozzles

When retreating any wax injected areas which have been disturbed during repairs it is necessary to use a compressed air spray gun with integral pressure cup and a selection of interchangeable lances.

In use the following principals should be observed according to the attachments used:

- Use the rigid or flexible lance attachments with 360° spray dispersal when spraying enclosed areas as these offer maximum coverage
- Where openings are restricted use the hook nozzle to provide a more directional spray (e.g. inside narrow or short box sections)
- Exposed underbody surfaces may be sprayed direct from the gun without using a lance attachment or disconnecting the fluid coupling

Self-Check -5	Written Test

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

1. Describe the principles of using spray ppattern of lance nozzles

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet 1	Treatment of bare metal surfaces

Method of treatment of bare metal surfaces

Steps:- To treat bare surface:-

1. Clean the repair area with the proper wax and grease remover and wipe dry.
2. Apply metal conditioner and conversion coating, as required. following the paint maker recommendations

4. Apply undercoats. Metal conditioner and conversion coating are not recommended for weld areas and for application inside enclosed areas after assembly.

Trea**tment of Weld Areas**:-

To treat bare surface:-

1. Before welding, clean the mating surfaces. Avoid any zinc coating.
2. Clean the mating surfaces and inside section of enclosed parts with the proper wax and grease remover.
3. Apply weld through primer to mating surfaces.
4. After welding, remove all welding residues.
5. Dress exposed welds on cosmetic surfaces.
6. Apply a self- etching, wash or epoxy primer.
7. Treat exposed seals.
8. Apply topcoat to cosmetic areas.

Treatment of enclosed Parts

To treat enclosed parts, such as rails, rocker panels and pillars:-

1. Clean the panels with the proper wax and grease remover before assembly
2. apply metal conditioner and conversion coating before assembly
3. Prepare the weld surface
4. Set the spray pattern for the primer by adjusting the pressure
5. Apply corrosion resistant primer inside the enclosed area.
6. Clear all drain holes after application
7. Treat exposed seams.
8. Apply anti corrosion compounds

Treatment of Exposed seams

To treat exposed seams:-

- Thoroughly clean the joint areas
- Apply corrosion resistant primer to the joint areas and allow to dry
- Apply an appropriate seam sealers to the expose seams
- apply primer to the exposed areas
- Apply topcoat to the exposed areas

Operation Sheet 2	Inspection of repaired areas

Procedures for inspection of repaired areas

Step "- -

1. Restoration of corrosion protection in areas where clamping and anchoring devices were installed, and where metal working was performed
2. No signs of corrosion
3. Complete and even coverage of coatings
4. No dissimilar metals in contact, such as aluminum trim parts contacting a steel panel at the edge of mounting hole.
5. No overspray on mechanical or electrical parts, or cosmetic surfaces
6. Proper application of sound deadening materials to underbody surfaces inside the trunk
7. Proper dressing of welds
8. Complete sealing
9. Coated wand access holes
10. Open drain holes.
11. Correct any defects

Operation Sheet-3	Application of anti-corrosion Compounds

Procedures for application of anti-corrosion Compounds

Steps :-

1. Adjust the pressure on the spray system for the anti-corrosion Compounds
2. Apply anti-corrosion Compounds to enclosed interior surface and underbody areas
3. Apply sound deadening materials to the underbody areas and inside the trunk
4. Repair any other damage to the existing corrosion protection coatings.

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 5 hour.

Task 1. Treat bare metal surfaces

Task 2. Inspect repaired areas

Task 3. Apply anti-corrosion Compounds

List of Reference Materials

https://home.howstuffworks.com > heat-gun-to-dry-paint-in-cold-weather

https://www.google.com

https://www.how-to-spra

https://www.fully-adhered-vs-mechanically-attached

https://www.product-management-process specifications

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 # 22

Unit of Competence: - Apply Rust Prevention and Sound Deadening Materials

Module Title: Applying Rust Prevention and Sound Deadening Materials

LG Code: EIS VRP2 M07 LO4-LG-22

TTLM Code: EIS VRP2 TTLM 0919 v1

LO 4: Cleanup work area and maintain equipment

Instruction Sheet	Learning Guide # 22

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

- Collecting and storing reusable material
- Disposing of and/or storing waste material
- 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 –**

- Collect and store material that can be reused
- Dispose of and/or store waste material in accordance with statutory and enterprise requirements.
- Clean and inspect equipment and work area for serviceable condition in accordance with workplace procedures.
- Tag unserviceable equipment and identify faults in accordance with workplace procedures.
- Complete operator maintenance in accordance with manufacturer/component supplier specifications and worksite procedures.
- Maintain ***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 88 -.**
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 91** .

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 93**.
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 96**
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 99**
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 108**
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 109**. 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 110**. 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 111.** However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.
25. Read the “Operation Sheet 3” and try to understand the procedures discussed.

Do the “LAP test” **in page 112** (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 reusable material

4.1. Collecting and storing reusable material

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

Self-Check -1	Written Test

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

1. Which of the following is the requirements NESHAP 6H rule?
   A/ Paint booth exhausts systems implementation of 98% efficient booth filters
   B/ Spray booths/prep stations must be used
   C/ Spray guns must be efficient types, such as HVLP D/ All are correct answers

2. What is the purpose of 6H rule

3. The acronym NESHAP stands for:-

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet-2	Disposing of and/or storing waste material

4.2. Disposing of and/or storing waste material

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 -2	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. Among those around 11/eleven **material** movement and storage activities list at least 6/six of them.

3. What is the basic function of material handling?

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

6.3. **Cleaning and inspecting equipment and work area**

1. 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.F

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 disposal

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 precautions)

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***

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.

4.6.1. Maintaining Hand tooling

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

Keep tools in a dry place with low humidity – away from clothes dryers, laundries, etc. Hang garden **tools** off the floor. If you use a toolbox or drawers, use silica gel packs to absorb moisture, or invest in anti-rust drawer liners.

4.6.2. Maintaining Power tooling

Maintaining 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

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

4.6.3. Spray guns

Be sure to properly clean all spray guns and your spray booth after each coating application. This ensures proper operation and removes leftover coating products from the coating cup, lines, and nozzle.

Spray guns maintaining/ Cleaning process

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 techniques, still commonly used in many small shops, release an excessive amount VOCs to the atmosphere.

4.6.4. Maintaining Heat guns

The method of operation of a hot air gun is similar to a hair drier: a fan pulls air in to the body of a tool and drives it across an electric heating element and out through a nozzle. Some heat guns can be used sitting on a bench so that hands are free to use hot air for other applications.

Cleaning and maintenance of heat gun

- Use a soft, dry brush to clean the openings periodically.
- Use only mild soap and a damp cloth to clean the heat gun.

Many house hold cleaners contain chemicals which could seriously damage the housing.

For storing, cool down for 5min. or more. When applying hot air to an object, keep a distance of 3cm. or more between the air out let nozzle and the object being heared.

Do not drop the heating gun or object it to other strong impact.

Do not use the heating gun in areas filled with flammable gases, dust,etc.

4.6.5. Air pressure regulators

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**.**

4.6.6. Heating and lighting systems

The **lighting system** of a motor **vehicle** consists of **lighting** and signalling devices mounted or integrated to the front, rear, sides, and in some cases the top of a motor **vehicle**.

There are **three** basic **types of lighting** you should layer in a room in order to accomplish this: Ambient or general **lighting**. Accent **lighting**. Task **lighting**.

Different types of lights or lamps in a lighting system

- Incandescent lamps.
- Compact fluorescent lamps.
- Halogen lamps.
- Metal halide Lamps.
- Light Emitting Diode.

- Fluorescent tube.
- Neon lamps.
- High intensity discharge lamp

LED Light Maintenance –

5 Tips for How to Maintain LED Lighting

1. Choose Appropriate LEDs. ...
2. Read User Manual before Use. ...
3. Clean Them Regularly. ...
4. Avoid High Temperature and Humidity. ...
5. Perform Inspections

Heating system

HVAC Basics

HVAC stands for Heating Ventilation and **Air Conditioning**. Its purpose in a **vehicle** is to clean, cool, heat, regulate, ventilate and dehumidify the air entering the cabin, depending on the inputs of the operator as well as electronic sensors.

Heat Pump Maintenance:

1. Check air filters monthly. ...
2. Keep outdoor unit clear of snow, ice, and debri. ...
3. Keep the outdoor coils clean. ...
4. Keep shrubs pruned back at least 18 inches from all sides of the heat pump to allow for proper airflow and servicing.

.

4.6.7. Maintaining Equipment

4.6.7.1. 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

4.6.7.2. Straining/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

4.6.7.3. Hand brushing equipment

How to keep paint rollers and brushes fresh

It's hard work, but rewarding. Every night after a few hours' work, clean out the rollers and brushes, using more water —and never up to par the next day.

To make the rollers and brushes last much, much longer (and save gallons of water in the meantime!),

- After painting done is for the day, wrap the roller or paintbrush in a wet towel.

- Place it in a plastic bag or wrap it with plastic wrap, and then—here's the secret—put it in the fridge. The roller or brush will stay fresh until you're ready to paint again!

This will make the roller last quite a bit longer and keeps cleanup to a minimum. You'll spend less money on supplies, and use many fewer resources. Sounds like a green dream come true

4.6.7.4. Mechanical fastening equipment

Mechanical fastening is the most common method of joining many materials within industry. ... Screws are a reliable and inexpensive method of **mechanical fastening**. They do not require molded-in threads or threaded inserts, reducing molding and assembly costs.

Mechanical Fixings. Choice of **fixing**. Definition: a **fixing** is defined as a proprietary plastic anchor for **fixing** external wall insulation systems with rendering, as defined in ETA

Fastener tools are often the first to be selected for the handyman's toolbox. They are simply **tools** that help you apply **fasteners**, such as nails, bolts, and adhesives.

Fastener tools include hammers, screwdrivers, pliers, and clamps.

A **fastener** (US English) or **fastening** (UK English) is a hardware **device** that mechanically joins or affixes two or more objects together. In general, **fasteners** are used to create non-permanent joints; that is, joints that can be removed or dismantled without damaging the joining components.

How to prevent galling

1. joints together
2. Slow down installation speed/
3. Do not use bolts to pull
4. Use a lubricant
5. Use extra care with lock nuts
6. if a fastner beginsto bind: Stop

Self-Check -6	Written Test

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

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

2. **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 hand tools

Procedures for maintaining hand tools

Step 1-

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

.

Operation Sheet 2	Maintaining Spray guns

Procedures for maintaining Spray guns

Steps:-

Spray guns maintaining/ Cleaning process

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.

Operation Sheet 3	Maintaining Air pressure regulators

Procedures for maintaining Air pressure regulators

Steps:-

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

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 3:30 hour.

Task 1. Maintain hand tools

Task 2. Maintain spray gun

Task 3. Maintain air pressure regulator

List of Reference Materials

EPA Collision Repair Campaign web site CCAR-*Green*Link "Paint Rule"

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