Vehicle Painting

Level III

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LG #22	LO #1- Prepare for work

Instruction sheet

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

Using work instructions by determining work requirements, including methods, material and equipment, Reading and interpreting Job specifications, Observing personal protection **needs** and requirements of workplace Health and Safety (WHS), Selecting material for work, Identifying and checking equipment and tooling for safe and effective operation, Deterring Safe operating procedures to minimize waste material, Identifying procedures for maximizing energy efficiency while completing the work.

This guide will also assist you to attain the learning outcomes stated in the cover page. Use work instructions by determining work requirements, including methods, material and equipment, Rea and interpreting Job specifications, Observing personal protection **needs** and requirements of workplace Health and Safety (WHS), Select material for work, Identify and check equipment and tooling for safe and effective operation, Deter Safe operating procedures to minimize waste material, Identify procedures for maximize energy efficiency while completing the work.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test

Information Sheet 1- Using work instructions by determining work requirements, including methods, material and equipment.

1.1. Work Instructions

Work Instructions are documents that clearly and precisely describe the correct way to perform certain tasks that may cause inconvenience or damage if not done in the established manner. That is, describe, dictate or stipulate the steps that must be followed to correctly perform any specific activity or work.

Work instructions are also called work guides, Standard Operating **Procedures** (SOPs) job aids or user manuals, depending on the situation. In any case, the purpose of the work instructions is to clearly explain how a particular work task is performed.

Difference between Work Instructions and Procedures

Another way of looking at Work Instructions v Procedures is that:

Procedures describe**:**

- What is the activity is
- Who performs it
- When it is performed

Work instructions describe:

- How the activity is performed.

Purpose of Work Instructions

A work instruction is a tool provided to help someone to do a job correctly. This simple statement implies that the purpose of the work instruction is quality and that the target user is the worker. Unfortunately, in many workplaces, today's work instructions have little connection with this fundamental focus. Factories have encumbered work instructions with content that has been added to satisfy auditors, lawyers, engineers, accountants and yes, even quality managers. We've piled on so much extraneous material that we've lost sight of the intended purpose of work instructions.'

Steps to Writing Work Instructions

- Follow these steps to write your next set of Work Instructions.
- Know exactly how to perform the task.

- Plan how to write steps in the correct order.
- Write the steps in logical order.
- Start each instructions with a verb.
- Write each step as a single action.
- Include warnings as pre-steps.
- Review and edit instructions carefully.
- Write in the positive voice.
- Avoid opinions, preferences, or choices.

Using work methods

Work methods are the physical actions employed to perform a task. Evaluating and modifying work methods to prevent discomfort and injury is one of several components of an effective ergonomics program. Work methods are also called work practices

The working method will have to be:

- Clearly explained. It will need to be understood by the team working under water, often taking turns, which will have to take individual decisions.
- Rapid to implement. There is a limit to the time that can be spent under water.
- Straightforward to implement. Working under water is hard enough without the addition of further complications.

Spray gun techniques

Spray gun technique and its relationship to atomization of products is often misunderstood by many automotive refinishers. Proper gun technique involves four facets: gun angle, speed, path, and distance. Before handling the gun, it is important to adjust the spray pattern properly.

The proper spray gun pattern is elliptical in shape (8 – 10 inches in Length) with and even amount of material across the entire surface.

- Heavy in the middle could mean too little air flow.
- Divided in the middle could mean too much air flow.

Too much paint at the top or bottom could mean a restriction in the fluid flow, usually at the fluid needle and/or air cap. Clean both and retest.

A crescent shaped pattern could mean a restriction at the fluid needle and/or air cap on one side. Clean and retest. With the air cap turned 90 degrees and a heavy amount of

material sprayed, the test pattern should be 8 – 10 inches long, elliptical in shape, and the “runs” a consistent length along the whole pattern.

GUN HANDLING PROBLEMS

The inexperienced painter is prone to several spraying errors including:

Heeling:-This occurs when the painter allows the gun to tilt because the gun is no longer Perpendicular to the surface, the spray produces an uneven layer of paint, excessive over spray, dry spray

- **Arcing:-** This occurs when the gun is not moved parallel with the Surface the result is uneven film build up
- **Speed of stroke**: If the stoke is made too quickly, the paint will not cover the surface evenly. If it is made slowly, sags and runs will develop the proper stroking speed comes with experience
- **Improper overlap**: Improper overlapping results in uneven film thickness, sags and runs
- **Improper Leverage**:- Triggering at the wrong time (on the nearby panel) is another common error.
- **Spraying techniques**

There are several variables contributing to the quality of the spray finish including spraying material viscosity, spray booth temperature, film thickness, and spray practice.

Table: - 1 spraying viscosity

Material	Reduction	Viscosity
Acrylic enamel	30 (1/3)%	19 seconds (19")
Acrylic enamel	50%	18 seconds (18")
Acrylic lacquer	150%	15 seconds

Reduction ratio guide

Reduction percentage	Mixing Ratio	Paint material	Solvent materials
25	4:1	4 parts	1 part
33	3:1	3 parts	1 part

50	2:1	2 parts	1 part
75	4:3	4 parts	3 parts
100	1:1	1 parts	1 part
125	4:5	4 parts	4 parts
150	2:3	2 parts	2 parts

FILM THICKNESS

The amount of material sprayed on a surface with one stroke of the gun will depend on:

- Width of far,
- Amount of reduction.
- Distance from gun,
- Speed of stroke
- Air pressure at the gun

ADJUSTING THE SPRAY (For suction feed spray gun)

A good spray pattern depends on the proper mixture of air and paint droplets much like a fine tuned engine depends on the proper mixture of air and gasoline. There are three basic adjustments, which under normal conditions will give the proper spray pattern, degree of wetness, and air pressure for suction feed guns. Adjust the air pressure to the specification indicated on the paint can Set the size of the spray pattern using the fan adjustment or pattern control knob Set the fluid control knob to regulate the amount of paint according to the selected pattern size: backing the knob out increases the paint flow turning the knob decreases paint flow.

Testing the spray pattern

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

- Hold the gun 6 to 8 inches away from the paper if spraying lacquer and 8 to 10 inches for enamel. Pull the trigger all the way back and release it immediately. This burst of paint should leave a long, slender pattern on the last paper.
- Turn the pattern control knob in until the spray pattern is 6 to 8 inches high
- For spot repair, the pattern should be about 5 to 6 inches from top to bottom. For paper or overall repair the length of the pattern should be 9 inches from top to bottom.

The Application Stroke

The proper stroke is most important is obtaining a good refinishing job. To obtain a good stroke, proceed as follow:

- Hold the spray gun at the proper distance from the surface
  Short- the high velocity air tends to ripple wet film
  Long- A greater percent of thinner evaporated (dry film result), loss of material
- Hold the gun level and perpendicular to the surface, otherwise uneven paint film will result
- Do not fan the sun and do not use wrist motions if a uniform film is desired. The only time it is permissible to fan the gun is on a small spot spray where the paint film at the edges of the spot should be thinner than the center portion
- Move the gun with a steady deliberate pass, about 1 foot per second. Moving the gun too fast will produce a thin film, while moving it too slowly will result in the paint running.
- Release the tiger at the end of each pass

Difficult areas such as corners and edges should be sprayed first Generally, start at the top un upright surface such as a door panel. The spray gun nozzle should be level with the top of the surface, this means that the upper half of the spray pattern will hit the masking the second pass is made in the opposite direction with the nozzle level at the lower edge of the previous pass and the other half is sprayed on the unpainted area.

The last pass should be made with the lower half of the spray pattern below the surface being painted. The procedure just followed is called a Single Coat. For a double coat, repeat the single coat procedure immediately. Generally, two or more double coats are required to properly a lacquer top coat. Allow for flash time (the time required for the solvents to evaporate and the finish to dull slightly.) or several minutes between coats. Two or three single coats are normally required for enamel top coats when painting a car, spray painting techniques can be the difference in a great looking paint job and one that you might not want other people to see. Whether you will be using a standard auto spray gun or a car airbrush, there are ways that you can help ensure that you do the job right the first time and avoid wasting time and money in doing the job over again. Here are some tips to help you: Remove or Tape to Avoid Overspray- Until you are experienced in using a paint sprayer and comfortable painting cars, you should attempt to remove parts of the vehicle that need to be painted. This is especially true if you are

only painting a bumper, door or a single quarter panel. However, if you're not able to remove the piece, make sure that you tape off the area as to avoid overspray in areas of the vehicle that don't need to be painted. If you need to tape off an area, make sure to use a painter's grade of masking tape that will not damage the finish of the vehicle.

- **Surface Preparation is Essential**- Before you even hook up your spray gun, you should spend a lot of time preparing the surface of the vehicle. When painting a vehicle, sandpaper can often be your best friend. Use low grit sandpaper such as 80 or 300 grit pieces to smooth out the scratches or imperfections in the surface of the vehicle. You should also spend some time practicing good wet sanding methods with 1000 or higher grit papers. The more time you spend preparing the surface of the vehicle, the easier spraying the car will be.
- **Spray Several Light Coats Rather One Heavy One**- Many inexperienced car painters tend to try to paint a vehicle too quickly. Sometimes, you may be tempted to spray a lot of paint onto a car. However, this almost always results in runs or paint build up. Therefore, make sure that you hold your spray nozzle approximately 10 to 12 inches away from the vehicle and spray the vehicle with slow and even strokes. Spray the vehicle from black to left, and not up and down. If you miss an area don't break your rhythm and just wait until you apply the next coat to cover the missed area.
- **Don't Rush Between Coats**- After you've sprayed a coat of paint onto the vehicle, you'll need to give the codes enough time to set properly before applying the next coat. For most types of car paint, you should wait about 15 to 20 minutes between coats. If you are applying a primer, you should wait about 24 hours before applying a base coat or enamel based paint. Also, between primer and paint applications, you should wet sand the vehicle with a 1000 - 1200 grit piece of sandpaper. This will make spraying the vehicle much easier and allow you to use less paint to cover the car.
- **Correct Mistakes before Continuing**- If you do make a mistake while spraying the vehicle, continue spraying the current coat of paint. However, do not apply another coat of paint until the mistake has been corrected or repaired. Again, use

a piece of sandpaper to lightly sand away paint buildup or runs. Just make sure that you allow the paint to drive before correcting the mistake.

Drying procedures

There are four stages of spray paint drying:

- ✓ Surface dry wherein the solvent of the paint evaporates,
- ✓ Touch dry wherein the paint could stick to your finger or not
- ✓ Hard dry, the point when the paint layer has gotten harder and will not come off,
- ✓ Thorough dry wherein the part of the surface is dry and ready for use.

Drying usually refers to a solvent or thinner evaporating from the paint on a chemical reaction versus the evaporative process of drying. Depending on the type of auto paint used on your car, the paint may either dry, cure or dry then cure. curing is about the paint's binder and how it polymerizes. In other words, curing is dependent Enamel or acrylic enamel paint uses air to cure whereas urethanes and epoxies do not use air to cure. If you are using acrylic enamel paint, there is something you can do to help cure the auto paint.

Step 1

Put the car outside away from falling debris. Also keep the car far away from anything that you don't want to get paint on, such as other cars and buildings.

Step 2

Put on a respirator which can be obtained from the local hardware store. This protects you from harmful fumes emitted from the catalyst or hardener. Also put on protective eye goggles before beginning.

Step 3

Use a catalyst or hardener when applying acrylic four to six weeks to cure, now cures in a matter of days. Mix in the catalyst or hardener into the paint before painting the car. Stir the paint and catalyst or hardener with a paint stirrer until completely mixed.

Step 4

Spray the car with the paint, moving in a back and forth, side to side motion.

Allow the paint job to dry for four to six weeks if not planning to use a catalyst or hardener. Apply polish to the new paint job after it dries, but wait the full four to six **weeks to add any wax**.

Paint mixing methods

Auto Paint Mixing Safety Working on your car can be messy. It can also be dangerous. Paint, solvents, and other hydrocarbons can irritate the skin. Here's what you'll need to ensure you keep your jeans, shirt, and skin spotless, and your bones intact.
Nitrile gloves (to repel chemicals used).

Tips for How to Mix Automotive Paint Mix a small amount of paint ahead of the full amount. You can then apply this small batch to a test site to ensure your ratios are good and have the effect you wanted, all while not potentially ruining the rest of the paint.
Car manufacturers often have car-coded paints available through dealerships or online.

Procedures for paint mixing

- Read the instructions on the label thoroughly.
- Pry the lid of the container and stir the paint thoroughly with a stir stick.
- To make pouring easier, shape a pouring spout on the container using masking tape.
- Pour the paint to a graduated measuring container. If using a mark mixing stick, the container does not have to be graduated but must have a flat bottom and straight up and down sides.
- Add the proper reducing solvent in the proper ratio according to the manufacturer's label.
- Mix the solvent and paint together by stirring with a stir stick.
- If the paint requires hardener it must be added as directed on the label while stirring the paint.
- When all the ingredients stirred together, the viscosity can be check with a viscosity cup. This is done by dipping into the paint, pulling it out over the paint, and timing the amount of time in seconds it takes to empty the cut through the hole in the bottom. Check the manufacturer's viscosity time.
- I f the viscosity time is slower, reduce paint more. If the viscosity is faster, add more paint to slow it down.
- The paint is then strained into the spray gun cup using a paint strainer.
- The spray painting should start above the panel and to the bottom and at a distance of approximately 8" to 10" away from the panel to be painted.

Automotive paint can be broken down into basic categories: acrylic lacquer, acrylic enamel, urethane, and acrylic urethane, etc.

Each type requires a slightly different recipe and mixing method, so consult your owner's manual or your local dealership to determine the right paint for your car and follow the instructions carefully.

Acrylic Lacquer

Acrylic lacquer was an early industry standard that was phased out by the 1980s. In states regulating the use of harmful volatile organic compounds, or VOCs. Acrylic lacquer paints are illegal. Acrylic lacquer paints are easy to use and produce a glossy finish, but are more susceptible to damage from UV rays than a modern urethane-based paint-and-clear coat treatment is. Some classic-car restorers still use acrylic lacquers to maintain a factory-correct look on vintage cars that aren't used as daily drivers.

Mixing Acrylic Lacquer (Ratio 1:1 Paint/Thinner)

- Inspect the pre-marked mixing container for dust and debris. Wipe it out if necessary.
- Find the 1:1 ratio markers on the container; pour in the paint.
- Using a stirrer, mix the paint to blend the pigments fully.
- Using the 1:1 ratio markers as a guide, pour in the thinner.
- Mix the paint and thinner together for several minutes, making sure the consistency is uniform.
- You did it!

Acrylic Enamel

Acrylic enamel creates a hard exterior shell-like acrylic lacquer, but lasts longer and provides better UV protection.

Acrylic enamels are separated into two categories: single-stage, which dries to a glossy finish, and two-stage, which includes a base layer of pigmented paint and a separate clear coat. The clear coat adds a glossy finish and extra protection.

Mixing Acrylic Enamel One Stage (Ratio 8:1:1 Paint/Thinner/Hardener)

- Inspect the pre-marked mixing container for any dust and debris. Wipe it out if necessary.
- Read the paint's instructions on when to add each ingredient as some require the hardener to be added at a specific time.

- After you find the 8:1:1 ratio markers, pour in the paint.
- Using a stirrer, mix the paint to blend the pigments fully..
- Using the 8:1:1 ratio markers, pour in the thinner.
- Mix the paint and thinner together.
- At the indicated time, add the hardener, filling the container to the right 8:1:1 level.
- Stir the mixture together.
- You're ready!

Mixing Acrylic Enamel Two-Stage (Base Coat Ratio 1:1 Paint/Thinner, Clear Coat Ratio 4:1 Paint/Hardener)

Base Coat

- Inspect the pre-marked mixing container for any dust and debris. Wipe it out if necessary.
- After you find the 1:1 ratio markers, pour in the paint.
- Using a stirrer, mix the paint to blend the pigments fully.
- Using the 1:1 ratio markers, pour in the thinner.
- Mix the paint and thinner together.
- Done!

Clear Coat

- In a second pre-marked container, inspect for any dust and debris. Wipe it out if necessary.
- After you find the 4:1 ratio markers, pour in the clear coat.
- Stir the clear coat to make sure consistency is correct.
- Using the 4:1 ratio markers, add the hardener at the indicated time.
- You're done!

Urethane

Urethane paint is extremely resistant to rock chips and fading, and looks fantastic when applied correctly, but those properties come at a cost, which is generally higher than other automotive paints.

Urethane is also tricky to mix and apply, as ambient temperatures will determine which type of urethane activator is needed (fast, medium, or slow). Other factors that affect

urethane application are humidity, airflow, and total wanted paint thickness, which may require you to use paint thinner, and isn't usually recommended for weekend warriors.

Mixing Urethane Multi-Stage (Base Coat Ratio 4:1 Paint/Activator, Clear Coat Ratio 4:1 Paint/Hardener)

Base Coat

- Inspect the pre-marked mixing container for any dust and debris. Wipe it out if necessary.
- Find the 4:1 ratio marker and pour in the paint.
- Using a stirrer, mix the paint to blend the pigments fully.
- Using the 4:1 ratio marker, pour in the correct activator (fast: below 70 degrees, medium: 70 to 80 degrees, and slow: above 80 degrees).
- Stir the paint and activator to combine.
- Repeat the process, allowing for drying times, if further base coats are required.
- All done!

Clear Coat

- In a second pre-marked container, inspect for any dust and debris. Wipe it out if necessary.
- After you find the 4:1 ratio markers, pour in the clear coat.
- Stir the clear coat to make sure consistency is correct.
- Using the 4:1 ratio markers, add the hardener at the indicated time.
- You're done!

Acrylic Urethane

Acrylic Urethane is now the industry standard as it provides long-lasting UV protection, excellent resistance to chips and dings, and is cheaper.

But like Urethane, ambient temperatures will affect what types of urethane activator is used (fast, medium, or slow), and humidity, airflow, and total wanted paint thickness can require additional steps and considerations. This isn't recommended for weekend warriors.

Mixing Acrylic Urethane (Base Coat Ratio 4:1 Paint/Activator, Clear Coat Ratio 4:1 Paint/Hardener)

Base Coat

- Inspect the pre-marked mixing container for any dust and debris. Wipe it out if necessary.
- Find the 4:1 ratio marker and pour in the paint.
- Using a stirrer, mix the paint to blend the pigments fully.
- Using the 4:1 ratio marker, pour in the correct activator (fast: below 70 degrees, medium: 80 to 70 degrees, and slow: above 80 degrees).
- Stir the paint and activator to combine.
- Repeat the process if further base coats are required, allowing for drying times.
- All done!

Clear Coat

- In a second pre-marked container, inspect for any dust and debris. Wipe it out if necessary.
- After you find the 4:1 ratio markers, pour in the clear coat.
- Stir the clear coat to make sure consistency is correct.
- Using the 4:1 ratio markers, add the hardener at the indicated time.

Paint straining methods

Paint strainers are disposable painting products designed with a fine mesh material. The purpose of a paint strainer is to remove all impurities (clumps, dirt, dust, dried flakes, etc.) from the paint, prior to a paint job.

Types of strainers

From small, funnel-shaped fine mesh strainers to larger 5-gallon bag strainers- there is a wide range of options and sizes for any paint job type. The most popular options include:

Bag Strainers: Bag paint strainers are great for all types of paints, stains, varnish, and liquids. These strainers remove dried flakes, lumps, filaments and other dust particles. Bag strainers are ideal for 1, 2 or 5 gallons of paint and are designed with double stitched edges for durability. Available in plain top and elastic top options (Elastic top strainers provide a snug fit on the paint bucket rim, and stay in place.)

Cone Strainers: The tried and true, traditional cone strainer is great for removing impurities in latex paint and oil-based paints. Unlike the bag strainer, cone strainers also known as paper paint strainers, are not designed to fit around the edge of a paint bucket. We recommend using a cone strainer holder to filter paint above a paint bucket.

Available in multiple mesh counts (the higher the mesh count, the fewer impurities can filter through)

Pump Strainers: Pump strainers are used to filter unwanted, superfine particles, specifically in spray equipment to prevent clogging. These strainers typically include an opening for a spray pickup tube. Decrease your prep time, and strain as you spray!

How to use a strainer

Although all strainers are designed to do the same thing, their processes may differ based on the type of strainer you use.

Bag strainers are great for larger amounts of paint. To use, simply

- Place the bag strainer in the bucket and fold the top edge over the budget rim.
- Carefully pour the paint into the bag.
- Avoid straining too much at once, as it may take time to separate the paint and impurities.
- Using a strainer above the bucket.
- Carefully pour the paint into the paper paint strainer.
- Position the strainer on the bucket rim, and thread the spray hose through the provided opening.

Paint thinning methods

Paint is divided into two categories: oil-based (or alkyds) or water-based paints. Oil-based paints should be thinned or cleaned up only with petroleum or mineral-based products. In contrast, latex paint is water-based and should be cleaned up and thinned only with water.

How to Thin Automotive Paints

- Prepare paint for thinning. Set aside the appropriate amount of paint you will need for your project. ...
- Fill a spray bottle with paint thinner or lacquer. These items are sold at any hardware supply store. ...
- Combine the thinner into the automotive paint. ...
- Mix the thinner and the paint.

Thinning automotive paint is necessary before using a spray gun to apply the paint. The paint needs to pass easily through the gun's nozzle to achieve an even color across your auto's surface. If the paint is too thick, you won't have an even flow out of the

airbrush gun and the gun will continually get clogged. Thin your automotive paint to a more appropriate consistency before you attempt to airbrush for an easier application.

Step 1

Prepare paint for thinning. Set aside the appropriate amount of paint you will need for your project. It is best to set aside all of the paint you will need in the project all at once. This will ensure all of the paint is thinned evenly and in the same fashion. Place the paint in a clean plastic container.

Step 2

Fill a spray bottle with paint thinner or lacquer. These items are sold at any hardware supply store. You will need to choose the appropriate thinner or lacquer to mix with the type of auto paint you will be using. The contents of your paint will define what type of thinner you will use. Follow the guidelines on the back of each thinner container to choose one that works with the contents of your paint brand. Applying the thinner using a spray bottle will make for easier handling; it will decrease the chances of adding too much thinner and ruining your paint.

Step 3

Combine the thinner into the automotive paint. There is no exact measurement of thinner that should be used. It varies widely within brands and even colors. It is best to follow the manufacturer's outline for an approximate calculation. For the best results, spray a few squirts of thinner into the paint at a time while stirring with a mixing stick. This will allow you to monitor the paint's consistency as you go, rather than initially guessing the amount you will need.

Mix the thinner and the paint. Once you have reached a point of appropriate consistency, mix the combination well. To test the consistency, pick up the container of paint and gently tilt the container side to side. Before adding thinner, the paint would have a slow reflex, lagging slightly in drifting off the sides of the container after you tilt the container. Once you have reached the right consistency, the paint will drift at about the same speed that you are tilting the container. Keep in mind you do not want your paint to be too thin, which will show up as the movement of paint in the container being quicker than your tilting motion.

Color test card preparation

The automotive repair industry relies heavily upon the use of test cards. Before the first coat of a new color is sprayed on a new car, paint companies have prepared and evaluated test cards to ensure that the new formula will perform properly. The words “test cards” should remind us that we need to do an evaluation before moving on to the **real task at hand.**

Aftermarket retouch products are expected to perform as well as the original heat-cured coatings. During the past few years, paint suppliers have seen a move to raise the bar with regard to exposure durability and chemical resistance. This all started a few years ago when acid rain damage became an issue and was followed by the need for retouch products to have consistently better performance than previous products.

At the retouch level, increased product performance and/or durability can, in most cases, mean total reformulation of the product or revision of the existing formula. In the reformulation process, paint manufacturers may be forced to use another special additive or develop a new or revised resin base in order to gain the best possible product performance. Air-dried products are rigorously tested for humidity and chip resistance, salt spray, chemical resistance, long-term durability and color retention in some of the harshest environments possible. All paint companies are required to subject their test panels to a barrage of quality requirements. Those results are then scrutinized by many sets of eyes before the paint system receives final approval.

Test cards are needed when you’ve identified a problem color or when experience tells you matching could be a problem. Test cards are a routine part of any collision repair process. Developing test cards is not rocket science, and the following steps can be easily accomplished with the car in the prep stages, thus freeing up precious booth time.

PROCEDURE:

Step 1:

Spray the test card with a base-coat and a clear coat and compare it against the original paint work. Test spraying the test card with your base-coat color is important, it helps you determine if the color is going to match before spraying it onto the vehicle. It also gives you practice for learning the spray pattern of your paint spray can, so you’ll get a better finish without runs or drips.

Step 2:

Due to a vehicle's age, and how it has been looked after; garaged, etc. getting an exact match isn't always possible, which is why you aim for a "close" match.

Step 3:

Make sure you write the necessary details on the back of your spray test cards such as vehicle make and model, for future reference. Be sure to save your spray test cards to create your own personal color reference library. They will help you in the future save time and money and avoid any unnecessary waste of paint.

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I. Choose the best answer for the following question

1. -------- are documents that clearly and precisely describe the correct way to perform certain tasks that may cause inconvenience or damage if not done in the established manner. (3 pts)

   A. Work Instructions B. Procedures C. Specification D. Methods

2. Which of the following are types of paint strainers? (3 pts)

   A. Pump B. Bag C. Cone D. All

3. Which of the following includes under stages of spray paint drying? (4 pts)

   A. Surface dries wherein the solvent of the paint evaporates,

   B. Touch dry wherein the paint could stick to your finger or not

   C. Thorough dry wherein the part of the surface is dry and ready for use.

   D. All

Note: Satisfactory rating - 8 points Unsatisfactory - below 8 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Test I

1. ---------- 2. --------- 3. ----------

Information Sheet 2- Reading and interpreting Job specifications

2.1. Job Specification

A job specification defines the knowledge, skills and abilities that are required to perform a job in an organization. Job specification covers aspects like education, work-experience, managerial experience etc which can help accomplish the goals related to the job. Job specification helps in the recruitment & selection process, evaluating the performance of employees and in their appraisal & promotion. job specification and job description help in giving a overview of the job in terms of its title, position, roles, responsibilities, education, experience, workplace etc.

Importance of Job Specification

The importance and purpose of job specification is a thoroughly understand the specific details of a job. Jobs can be of different types and can require a different skill sets to get the maximum output from a particular.

- ✓ Gives important details related to the job like education & skills, prior work experience, managerial experience, personality traits etc which would help an employee accomplish the objectives of a job.
- ✓ For a recruiter, job specification lays down the guidelines basis of which the company can recruit and select the best possible candidate who would be best suited for the job. Apart from actually finding the right candidate or employee,
- ✓ Used for screening of resumes & shortlist only those candidates who are the closest fit to the job.
- ✓ Gives specific details about a job and what kind of skill sets are required to complete the job.

Components of Job Specification

There are many parameters which are considered while giving the job specification for a certain profile.

- ✓ **Educational Qualification:** This parameter gives an insight on how qualified a certain individual is. It covers their basic school education, graduation, masters degree, other certifications etc.
- ✓ **Experience:** Job specification clearly highlights the experience required in a particular domain for completing a specific job. It includes work experience which can be from a specific industry, position, duration or in a particular domain. Managerial experience in handling and managing a team can also be a job specification criteria required for a particular position
- ✓ **Skills & Knowledge:** This is an important parameter in job specification especially with knowledge and skill based profiles. The higher the position in a company, the more niches the skills become and more is the knowledge required to perform the job. Skills like leadership, communication management, time, team etc. are mentioned.
- ✓ **Personality traits and characteristics:** The way in which a person behaves in a particular situation, handles complex problems, generic behavior etc are all covered in the characteristics of a job description. It also covers the emotional intelligence of a person i.e. how strong or weak a person is emotionally

Job Specification Example

Here is a sample job specification, which is prepared for a marketing manager in a telecom company.

Education	Must be an engineer and MBA in marketing for a reputed MBA institute
Work experience	Must have prior work experience in marketing & sales (preferably telecom or FMCG)
Skills & Knowledge	Must be a good communicator and must be able to lead a team. Prior experience in handling ATL-BTL activities and managing promotional events. Must be able to handle social media like Facebook, Twitter and help build online brand Experience in managing PR and media Strong analytical skills and problem solving skills Must understand business, come up with innovative products and launch

	them
Personality Traits & Characteristics	1. Must be presentable and a good orator 2. Should be calm in complex situations and show leadership skills in managing multiple teams 3. Should be emotionally strong and should give timely deliverables

The above table is a sample of job specification. More specific details can also be put to give a better understanding about the job.

Advantages of Job Specification

There are several benefits of having a comprehensive job specification. Some advantages are listed below:

- Job specification highlights all the specific details required to perform the job at its best
- It gives the HR managers a threshold and a framework on the basis on which they can identify the best prospects
- Helps in screening of resumes and saves time when there are multiple applications by choosing those who are closest to the job specification
- HR managers can used job specification as a benchmark to evaluate employees and give them required trainings
- It also helps companies during performance appraisal and promotions

Disadvantages of Job Specification

As we know, job specification arises from the job description; it also has some related problems. Let us have a look at those limitations:

- Change in technology impacts the requirement of the company, i.e. changing of skills, qualification, experience, knowledge needed to execute the roles and responsibilities properly.

- A job specification is a lengthy process and requires complete knowledge of the job position.

Steps

Write up a rough outline. It can be helpful to create a rough outline of your job description before setting down to write the final versions. ...

- Decide on the job title. ...
- Include the details of the job. ...
- Create a summary of the job. ...
- Include the duties and responsibilities of the job. ...
- Add job factors to the description

Difference and Comparison of job specification and job description

BASIS	JOB DESCRIPTION	JOB SPECIFICATION
Meaning	Job description is the written document in which all the information regarding a particular job including role, responsibilities and duties is summarized in a systematic manner.	Job specification is the set of specific qualities, knowledge and experience, a person must possess to perform a particular job.
Origin	Originates from Job Analysis	Based on Job Description
Elements	Consist of job title, job location, role, responsibilities, duties, salary, incentives and allowances	Involves personal attributes, skills, knowledge, educational qualification and experience
Objective	Describes the job profile	Specifies the eligibility criteria
What is it?	What the company is offering to the candidate.	What the company is demanding from the candidate.
Application by	Used to give the sufficient and	Used to match the right

BASIS	JOB DESCRIPTION	JOB SPECIFICATION
Human Resource Manager	relevant information of the job	attributes with the job so described

Self-check 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

-------- 1. is the knowledge, skills and abilities that are required to perform a job in an organization (4)

A. Job specification B. Job procedure C. Job order D. Job profile

1. List four components of job specification (4 pts)

Note: Satisfactory rating - 4 points Unsatisfactory - below 4 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

1.

2.

Information Sheet 3- Observing personal protection needs and requirements of workplace Health and Safety (WHS).

3.1. Introduction

In industry, the most popular method of applying paint and coatings is to spray it on using an airless sprayer, compressed air, or an electrostatic applicator. Primers and lacquers are also commonly applied this way. When these products are sprayed on, mists and vapors are generated which can increase your exposure to the paints or coatings. This guide outlines some of the hazards associated with spray application and provides information on how to protect the workers. Paint is a general term for a family of products used to protect and add color to an object or surface by covering it with pigmented coating. There are several components to paint which can include binders, pigments, fillers, diluents, and additives. The most important component is the binder, which is generally made up of natural or synthetic resins such as acrylics, polyurethanes, epoxy or polyesters.

Health effects

Overexposure to a substance means that too much has been breathed in, swallowed or absorbed through the skin. The main way that one can be exposed to primer, paint or include:

- eye and skin irritation;
- respiratory tract irritation;
- dermatitis;
- dizziness/light headedness;
- drowsiness;
- disorientation; and
- nausea/vomiting

Safe work procedures

Safe work practices must be implemented at the work site. Such practices should include: Posting signs indicating “no sources of ignition” in the area where spraying

operations are taking place; Establishing a change out schedule for the filters used in a spray booth or spray room; Regularly cleaning the interior surfaces of a spray booth or spray room with non-sparking scrapers to remove excess paint deposits; Conducting routine inspections on the spray booth or spray room to ensure that equipment is maintained and running effectively; Ensuring that all spraying equipment is electrically grounded Following the proper storage requirements for the chemical products used.

Respiratory protective equipment

Respiratory protective equipment is used to remove contaminants from the air we breathe. It is very important to use the correct type of Appropriate personal protective equipment must also be used by workers who apply paint and other coating materials if other controls, such as ventilation, are not enough to reduce exposure. Respirator for the chemicals being used and the task conducted. There are two types of respirators commonly used in spray painting; the air- purifying and the atmosphere-supplying respirator.

protective clothing and equipment

This module details some very important personal safety rules that must be heeded while working. Horseplay is unacceptable! Proper, professional con- duct can also help prevent accidents. Horseplay is not fun when it sends someone to the hospital. Such things as air nozzle fights, creeper races, or practical jokes do not have any place in the shop. Stay away from anyone who does not take shop work seriously. Remember, a joker is “an accident waiting to happen.” Dress like a technician.

Fig 1 clothing

HEAD PROTECTION

Be sure to tie long hair securely behind your head before beginning to work on a vehicle. Hair that becomes tangled in moving parts or air tools can be torn out and mutilation can occur. Your hair should also be protected from dust and spray mists. To keep hair clean and healthy, wear a cap at all times in the work area. Wear a protective painter's stretch hood in the spray booth. There are numerous objects in the shop that can cause painful head injuries: car body panels, frame rack towers and chains, and other heavy equipment. Be careful not to accidentally hit your head on these objects while working in the body shop. A body technician should consider wearing a padded bump cap or welder's cap when working beneath hoods, under cars, or on a frame rack.

EYE AND FACE PROTECTION

Eye protection—safety glasses, goggles, face shields, hoods, or helmets are required at all times in most shops to comply with OSHA or insurance company requirements. Some type of eye protection should be worn at all Times when working in the shop Safety glasses are sufficient eye protection when doing tasks such as hammering, drilling, and cutting.

HAND PROTECTION

The harmful effects of liquids, undercoats, and finishes on the hands can be prevented by wearing work gloves. Impervious gloves such as the latex type or synthetic rubber gloves should be used when working with any chemical that can be harmful if exposed to your skin, such as solvents or two-part primers and topcoats. Chemical impervious gloves offer special protection from the materials found in two-component refinish or paint systems prevent hot sparks or beads of molten metal from going down into your shoes, causing painful burns to your feet.

Fig 2 plastic gloves

FOOT PROTECTION

It is best to wear *safety shoes* that have metal toe inserts and nonslip soles. The steel inserts protect the toes from falling objects; the soles help prevent falls. In addition, good work shoes provide arch support and comfort while standing and walking all day at work. Never wear gym shoes or dress shoes, which do not provide adequate protection in a body shop.

Fig 3 Quality leather work shoes

Use of tooling and equipment

This chapter summarizes how to properly select and use power tools and equipment. Most of the tools explained here are general purpose collision repair power tools.

More specialized tools and their uses are described in the appropriate chapters.

Power tools

Use air pressure (pneumatic), oil pressure (hydraulic), or electrical energy to effect repairs. This classification includes air wrenches, air and electric drills, sanders, and similar tools. Body shop technicians and painters must have a wide variety of power tools to make their tasks easier.

AIR-POWERED TOOLS

The automotive industry was one of the first industries to see the advantages of air-powered tools. Today they are known as “the tools of the professional technician.”

Although electric drills, wrenches, grinders, polishers, drill presses, and heat guns are found in body and refinishing shops, the use of pneumatic (air) tools is a great deal

More common. Pneumatic tools have four major advantages over electrically powered equipment:

- **Flexibility.** Air tools run cooler and have the advantage of variable speed and torque; damage from overload or stalling is eliminated. They can fit in tight spaces.
- **Light weight.** Air tools are lighter in weight and lend themselves to a higher rate of production with less fatigue.
- **Safety.** Air tools reduce the danger of fire in some environments where the sparking of electric power tools can be a problem. Air tools also do not use electricity, so the danger of electrocution is reduced.
- **Low-cost operation and maintenance.** Due to fewer parts, air tools require fewer repairs and less preventive maintenance. The original cost of air-powered tools is usually less than the equivalent electric type

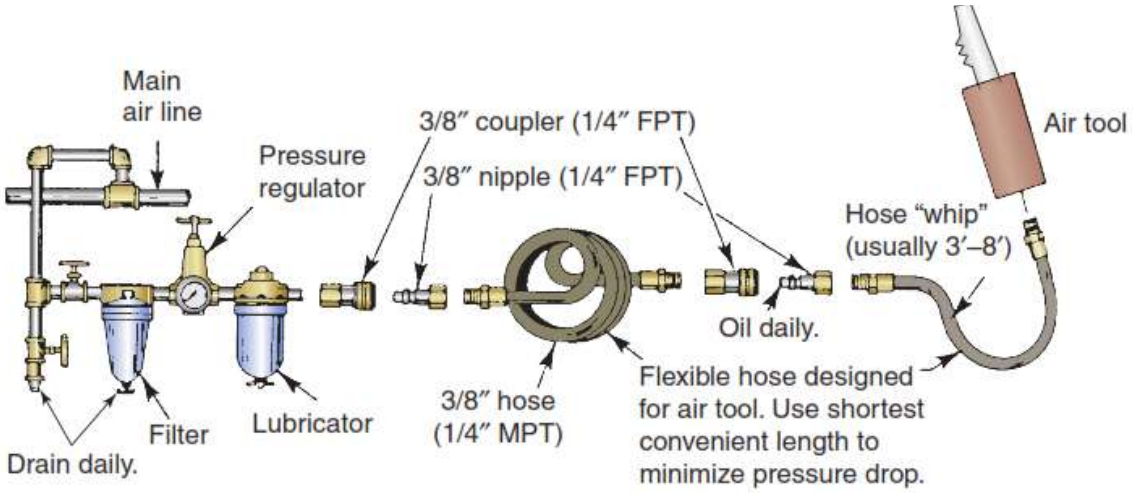

Fig. 4 flexible hose design air tool

There are pneumatic equivalents for nearly every electrically powered tool, from sanders to drills, grinders, impact wrenches, and screwdrivers. Furthermore, there are some pneumatic tools with no electrical equivalent, such as the chisel, ratchet wrench, grease gun, and various auto tools. Hoists, lifts, and frame and panel straighteners can be used in conjunction with a compressed air system. However, in most cases, these

pieces of equipment are hydraulically operated. Described later in this chapter, hydraulic tools play a very important role in any body shop operation.

SPRAY GUNS

- **Spray guns** are used to apply sealer, primer, paint, and other liquid finishing materials to a vehicle. Spray guns must atomize the liquid, often paint, so that it flows onto the body surface smoothly and evenly. A spray gun *atomizes* a liquid by breaking it into a fine mist of droplets. This requires sufficient pressure and volume at the gun, which can be powered by air or electric energy, although air is more common.

AIR SANDERS

An **air sander** uses an abrasive action to smooth and shape body surfaces. Different coarseness sandpapers can be attached to the pad on the sander. *Coarse sandpaper* Removes material more quickly. *Fine sandpaper* produces a smoother surface finish. Air sanders are one of the most commonly used air tools in auto body repair.

Fig-5-single-action sander

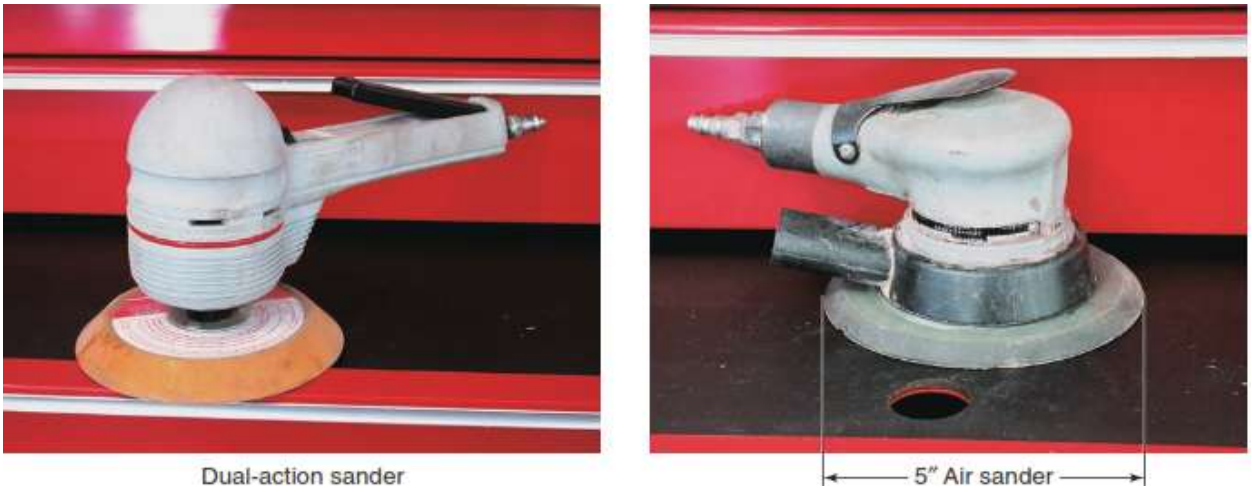

Fig-6- single-action sander

AIR GRINDERS

Grinders are used for fast removal of material. They are often used to smooth metal joints after welding and to remove paint and primer. They come in various sizes and shapes. The most commonly used portable air grinder in collision repair and refinishing shops is the disc-type grinder. It is operated like the single-action disc sander. An air grinder should be used carefully. It can quickly thin down and cut through body panels, causing major problems.

Fig-7- Grinders

ELECTRIC-POWERED TOOLS

As mentioned earlier in this chapter, shop tools such as sanders, polishers, impact tools, and drills can also be powered by electric motors. The most important electric-only tools are drill presses, bench grinders, vacuum cleaners, heat guns, and plastic

welders. Complete data on metal welders is given in while plastic welders are described in

HYDRAULIC TOOL

Hydraulic tools also require preventive maintenance to avoid failure at a critical moment. Just because a hydraulic tool is filled with hydraulic fluid does not mean it has been lubricated properly. Moving parts should be lubricated regularly with 30- or 40-weight oil. These parts include the moving mechanism, pump roller, universal joint, handle socket, pivot pins, wheels, and bearings. Also be sure to grease the fittings and sliding points used in pumping.

Fig -8- lift is commonly used to raise vehicles

Workplace environment and safety

GENERAL SHOP SAFETY PROCEDURES

In addition to personal safety, body/paint technicians must be aware of general shop safety procedures. This section outlines some of the rules and precautions that should be observed paint materials, but also to remove harmful mists and vapors Always remember to turn on the air exchange system when working in the paint booth or paint mixing room.

Fig-9- SHOP

Dustless Sanding Systems

Use a dustless sanding system to minimize exposure to toxic airborne dust particles created by sanding automotive paints and primers. A dustless sanding system uses a blower or air pump to draw airborne dust into a storage container, much like a vacuum cleaner. This action pulls airborne sanding dust through holes in a special sanding pad and sandpaper or through a shroud that surrounds the sanding pad. Some dustless system manufacturers claim that their machines can trap over 99 percent of the toxic dust created by sanding operations. Carbon monoxide (CO) is an invisible, odorless, but deadly gas! Car and truck engine exhaust produces harmful CO gas. CO poisoning from engine exhaust fumes can cause drowsiness and vomiting; it can even be fatal.

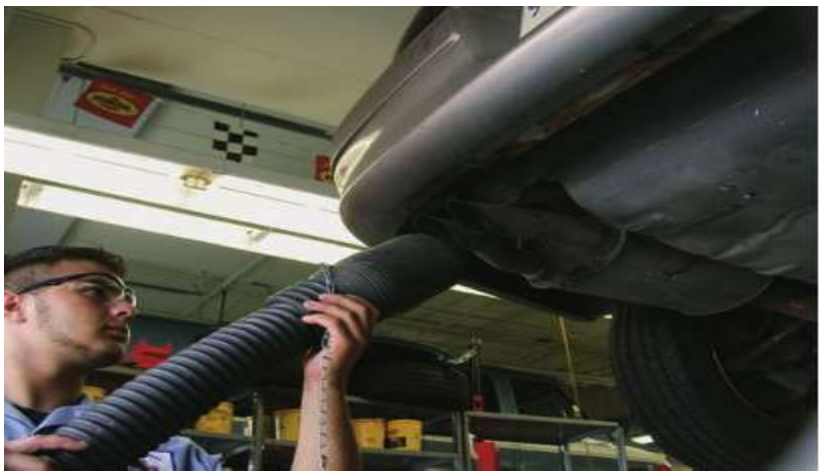

Fig 10 shop exhaust hose(s)

VEHICLE SAFETY IN THE SHOP

When driving a vehicle during repairs, keep the following safety rules in mind.

Drive carefully! Drive slowly and keep one window rolled down when in the shop. It is easy for someone to walk in front of a vehicle you are driving. If you have the window down, you can more easily hear instructions or warnings from coworkers. Look carefully in front of the vehicle. Make sure no one is working under a car with his or her legs sticking out into your stall.

Use of fire-fighting equipment

FIRE SAFETY

During a fire, a few moments of time can seem like a life- time. To be properly prepared to deal with a fire, know the locations of all fire extinguishers in the shop. You don't want to have to hunt for a fire extinguisher if a fire breaks out. A few wasted seconds can mean the difference between a "minor scare" and a "major catastrophe." Don't smoke! Besides being a health concern, smoking in a body shop is very dangerous. There are too many flammables that could start a fire in a body shop. Never light matches or smoke in the paint spraying area!

USING FIRE EXTINGUISHERS

A fire can be extinguished by depriving it of its essential in- gradients, which are heat, fuel, and oxygen. A fire extinguisher is a metal tank filled with a chemical agent designed to quickly smother and stop a fire. During a fire, a few seconds time can be a "lifetime" for someone. Know where all shop fire extinguishers are located and make sure you know how to use them. Every body shop must have fire extinguishers. Because fires are classified as A, B, C, and D, there are different types of extinguishers specially designed for each particular class of fire. Table - gives the common classes of fire that are found in body shops and methods of containing them. Some extinguishers are capable of being used on more than one type of fire. A multipurpose *dry chemical* fire extinguisher will put out ordinary combustible, flammable liquid and electrical fires.

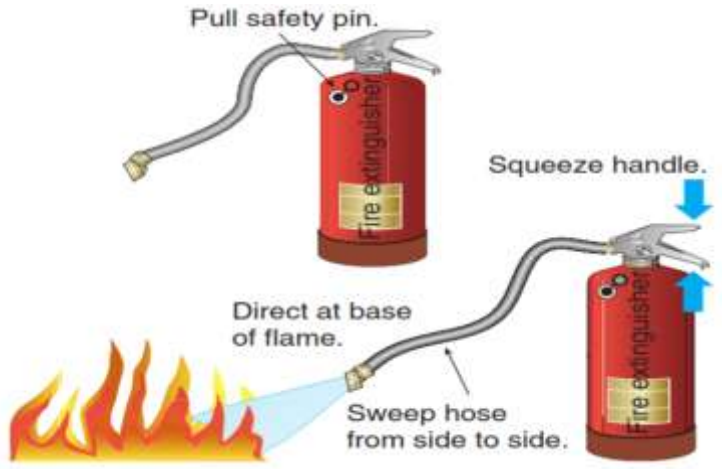

Fig-11 fire extinguishers

hazard control and hazardous material and substances

Work intelligently around hazardous materials! Be in- formed; read the warnings on the product labels and in manufacturers' literature. If more information is desired, get copies of the material safety data sheets (MSDS) for specific products from the shop's office or from the material suppliers. Water* 1 Foam* Multipurpose dry chemical Foam*
Carbon dioxide 5 Halogenated agent Standard dry chemical Purple K dry chemical

Hazardous waste

as determined by the Environmental Protection Agency (EPA), is a solid or liquid that can harm people and the environment. If the waste is on the EPA list of known harmful materials or has one or more of the following characteristics, it is considered hazardous.

- Ignitability means the material or waste fails the ignitability test if it is a liquid with a flash point below 140°F or a solid that can spontaneously ignite.
- **Corrosiveness** means a material or waste is considered corrosive if it dissolves metals and other materials or burns the skin. It is an aqueous solution with a pH of 2 and below, or 12.5 and above. Acids have the lower value and alkalis have the higher value. *Reactivity* means a material reacts violently with water or other materials or releases cyanide gas, hydrogen sulfide gas, or similar gases when exposed to low pH solutions (acid). This also includes material that generates toxic mists, fumes, vapors, and flammable gases.
- **Toxicity** means a material leaches one or more heavy metals in concentrations greater than 100 times primary drinking water standard concentrations. These

heavy metals include lead, cadmium, chromium, and arsenic. Complete EPA lists of hazardous wastes can be found in the *Code of Federal Regulations*. Materials and wastes of most concern to the body/paint technician are organic solvents that contain heavy metals, especially lead. During disposal, all hazardous waste must be handled according to the appropriate regulations.

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Choose the best answer for the following question

1. The following are core elements of successful safety programs except (2 pts.)
   A. Hazard identification and control systems C. Safety culture
   B. Employee training and empowerment D. None
2. Employers are also required to train each worker required to use personal protective equipment to know: (2 pts.)

A. When it is necessary C. What kind is necessary

B. The limitations of the equipment D. All

3. Employees should: (2 pts.)

A. Properly wear PPE,

B. Attend training sessions on PPE,

C. Care for, clean and maintain PPE

D. All

Note: Satisfactory rating - 6 points Unsatisfactory - below 6 points

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

Information Sheet 4- Selecting material for work.

Material selection is the act of choosing the material best suited to achieve the requirements of a given application. Many different factors go into determining the selection requirements, such as mechanical properties, chemical properties, physical properties, electrical properties and cost. These must be weighed during the material selection process.

- Materials Selection Process
- identify product design requirements
- Identify product element design requirements
- Identify potential materials
- Evaluate materials
- Determine whether any of the materials meet the selection criteria
- Select materials

Paint is a chemical product composed of many raw materials. The properties of the paint are determined by the binder while the pigment prevents rust and gives the paint its color. Material inspection is an important tool to achieve quality concept. It is necessary to assure confidence to manufacturer and aims satisfaction to customer. Material inspection is an indispensable tool of modern manufacturing process. It helps to control quality, reduces manufacturing costs, eliminate scrap losses and assignable causes of defective work.

Purpose of Inspection

- To distinguish good lots from bad lots.
- To distinguish good pieces from bad pieces.
- To determine if the process is changing.
- To determine if the process is approaching the specification limits.
- To rate quality of product.
- To rate accuracy of inspectors.
- To measure the precision of the measuring instrument.
- To secure products-design information.
- To measure process capability.

Our raw material inspections are a vital step in that process, helping to ensure that your supplier is meeting your specifications and giving you insight into the nature of your raw materials':

- Identity
- Safety
- Suitability for your product

A vast range of industries use raw materials testing at the start of the production process. These include, but are not limited to, consumer goods and retail, health and wellbeing, food and agriculture, and automotive businesses.

A raw material inspection is to select materials or item for a manufacturing or processing at factory at first stage. Inspection and tests on all aspects of materials as physical, chemical, AIM's inspector determine or verify materials the requirements of a specification, regulation, or contract are met. The main objective of inspection is to meet customer requirements, wants, and needs. The objective is to prevent defective product flowing down the successive operations and prevent loss to the company. Many characteristics cannot be inspected at the final stage of production. during painting the technician use different materials. some of these are

Acrylic lacquers

Acrylic Lacquer is a premium Automotive formulation designed to give a lustrous durable finish. Our formula dries quickly, has superior adhesion to metal, and dries to high gloss sheen. Once dry, it can be machine or hand buffed for an even glossier appearance.

- Premium Automotive Formulation
- Any-angle spray technology
- Comfort-tip spray nozzle
- Excellent adhesion
- Indoor/Outdoor durability

Now, we get into the rarer types of paint. Acrylic lacquers have been discontinued by many manufacturers, simply because they are now considered outdated.

Acrylic lacquers are used on classic or antique cars, because these vehicles aren't used as daily drivers. This is the same reason you find acrylic lacquers on showroom vehicles. This is a paint that undisputedly provides the most glaring shine on a vehicle.

But, this sunglass-inspiring shine comes at a price: it doesn't provide nearly as much protection as a clear coat finish would and so should only be used on limited use cars. If you used this as a daily driver, you'd end up paying dearly trying to keep the finish showroom-shiny. More often than not, these lacquers are mixed with a thinner to make them easier to spray because, on its own, lacquer is typically a thick, glue-like substance.

Air dry synthetic enamels

Synthetic Enamel paint is a type of oil based paint with superior adhesion qualities. It is available in two types of finishes - glossy and matt and can stick to all primers. It can withstand frequent cleaning without losing its shinning. The paint is fairly durable and stain resistant. AIR DRY ENAMEL is high quality synthetic enamel that is suitable for re-spray of automobile and touch up of original paint work. AIR DRY ENAMEL dries and cures naturally when exposed air. This paint is ideal for painting new or maintenance purpose in various industries such as in automotive, general metal and furniture. With its exciting colour option and superb gloss retention, AIR DRY ENAMEL comes in 490-series and 450-series, which the 450-series has become a favorite choice in the market in recent years due to economic advantage and its good quality.

Features:

- High quality synthetic enamel
- Exciting colors to choose
- Superb gloss retention
- Wide range of usage

Two-pack urethane acrylic enamels

Two-pack Acrylic Polyurethane Enamel is an acrylic polyurethane enamel which provides a durable high gloss exterior and interior coating for chemical and saline coastal environments. It has excellent color and gloss retention properties. When fully cured, it forms an extremely tough and abrasion resistant finish.

Acrylic Polyurethane Enamel (2 Pack) is an acrylic polyurethane enamel which provides a durable high gloss exterior and interior coating for chemical and saline coastal environments. It has excellent color and gloss retention properties. When fully cured, it forms an extremely tough and abrasion resistant finish. A non-pigmented version is available. Acrylic urethane enamel is a high performance, two pack acrylic urethane coating. It has superior resistance to UV degradation when compared to most imported similar products. Although it can be low baked, it's extremely fast curing properties allow it to air dry satisfactorily at normal ambient temperatures. In addition, its unique formulation and solvent balance allows it to be used with conventional one pack primers and putties. It can also be supplied direct to clean baked enamel and two pack enamel surfaces. Maximum adhesion to these surfaces is achieved after light sand.

Pearl finishes

A pearl finish is a medium gloss that maintains high durability. Both beautiful and easy to clean, a pearl finish lends dimension to trim while being optimal for walls in high-traffic areas. General Finishes Pearl effects are water based decorative, acrylic pearlescent colors used to create specialty finishes. They may be applied over General Finishes milk paints, stains and water based topcoats to create a translucent metallic Pearl effect. Pearl effects are thick enough to cover a surface but may also be brushed on lightly to create a dusting effect. Experimentation is the key to using this versatile product. This product will give you a metallic copper-color. This is an opaque paint, meaning it has solid coverage...not transparent. It is more of a red copper. Typically, aluminum specs are what give metallic paint its glittery shimmer, making the color appear more vibrant. Pearl paint uses mica to give the cara subtle array of colors. These tiny, man-made ceramic crystals reflect and refract light, which varies what colors you see when you look at the painting Pearl paint has tiny flecks of iridescent mica added to a clear coating that acts a binder for the pearl. When applied over white or in between a base

Self-Check -6	Written Test

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

1. List at least five types of material selection process? (5paint**)**?

2. List at least two housekeeping tips? 5 point

Note: Satisfactory rating - above 8 points Unsatisfactory - below 8 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer Questions

1.

2.

Information Sheet 5 Identifying and checking equipment and tooling for safe and effective operation.

TOOL AND EQUIPMENT SAFETY

Do not risk injury through lack of knowledge; use shop tools or perform repair operations only after receiving proper instruction. Note that safety tips and important safety procedures are given throughout this book. It is imperative that you observe the following hand and power tool safety guidelines.

HAND TOOL SAFETY

Do not use hand tools for any job other than that for which they were specifically designed. For example, never hammer on a file or screwdriver. The tool could break and cause injury. Hand tools should be kept clean and in proper work ing condition. Greasy, oily hand tools can easily slip out of one's grasp, causing skinned knuckles or broken fingers. Wipe tools with a shop rag before putting them away. Dirty tools are unprofessional and dangerous Pull; don't push, on a wrench. If the wrench accidentally slips off the fastener, you are likely to smash your hand. If you have to push, use the palm of your hand with your fingers open. Never open several toolbox drawers at once. Your toolbox cans flip over and cause serious injury, or even death. A full tool chest can weigh as much as a ton (2,000 pounds) Remember to slide each drawer shut before opening the next. Check all hand tools for cracks, chips, burrs, broken teeth, or other dangerous conditions before using them. If any tools are defective, repair or replace them. Be careful when using sharp or pointed tools that can slip and cause cuts and contusions (bruises). Keep chisels and punches properly ground and shaped. Chisel cutting edges should be sharp and square.

The head of a chisel or punch can become "mushroomed" (deformed and enlarged) after prolonged hammering. If this happens, a piece of metal could fly off the head when

POWER TOOL AND EQUIPMENTSAFETY

Do not operate a power tool without its guard(s) in place. Disconnect the tool's air hose or electrical cord before performing any service or maintenance on the tool. Refer

Do not attempt to use a power tool beyond its stated capacity. For example, grinding discs and stones usually have a maximum revolutions per minute (rpm) stamped on them. Make sure the power tool does not exceed the rpm for the grinding disc, brush, or other tool. The disc or brush could explode and throw off chunks of abrasive or steel wire with great force. When grinding to maintain a tool, grind slowly to avoid overheating the case-hardened metal. If you grind fast enough to turn the metal a blue color, you have probably ruined the tool. Too much heat removes the case hardening from the metal and softens the metal in the tool.

Fig-12- using an air sander USING COMPRESSED AIR

Be careful when using shop air pressure! Shop air pressure is usually around 100 to 120 psi (689 to 1,034 kPa). This is enough pressure to severely injure or kill. Use the utmost caution with compressed air. Pneumatic tools must be operated at the pressure recommended by their manufacturers.

USING FLOOR JACK AND STANDS

Technicians often use a **floor jack** to raise the front, sides, or rear of a vehicle while working. To avoid vehicle damage, place the jack saddle under a recommended lift point under the vehicle (frame rail, pinch weld, suspension arm, or rear axle). If the saddle is not properly located, it is easy to dent and damage sheet metal parts in the underbody normally rotate or turn the jack handle or knob clockwise to close off the hydraulic valve for raising the saddle. Then pump the handle up and down without hitting anything. Raise the vehicle slowly. As soon as the vehicle is high enough, secure it on jack stands. **Jack stands** are required to hold a vehicle after it is raised by a floor jack. Use jack stands to support a vehicle whenever you must work under it . After rising, lower the vehicle down onto the jack stands. Place the vehicle in park, then apply the emergency brake and block the wheels. Be aware that even when the car is resting on jack stands, it can still be jolted enough to bump it off the stands.

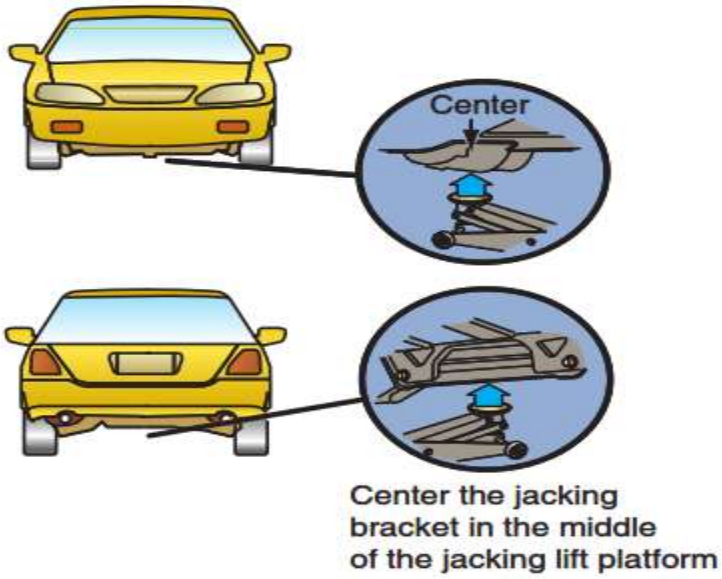

Fig-13 jacking points

Self-Check -6	Written Test

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

1. Explain abate hand tool safety?

2. What is hand tool safety?

Note: Satisfactory rating - above 8 points Unsatisfactory - below 8 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer Questions

1.

2.

.

Information Sheet 6-Deterring Safe operating procedures to minimize waste material.

Identifying hazards

The first step in managing risks associated with spray painting or powder coating activities is to identify all the hazards that have the potential to cause harm.

Potential hazards may be identified in a number of different ways including:

- Conducting a walk through assessment of the workplace observing the work and talking to workers about how work is carried out
- inspecting the materials and equipment that will be used during the spray painting or powder coating process
- reading product labels, safety data sheets (SDS) and manufacturer's instruction manuals
- talking to manufacturers, suppliers, industry associations and health and safety specialists
- Reviewing incident reports.

Table 1 below lists the common hazards associated with spray painting or powder coating.

Table 1 Examples of common spray painting and powder coating hazards

Hazard	Potential harm	Examples
Hazardous chemicals	• dermatitis, respiratory illnesses and cancers • some hazardous chemicals are also fire and explosion risks	paints, solvents, adhesives, resins, rust removers, rust converters, lacquers and degreasers

Hazard	Potential harm	Examples
Fire and explosion	serious burns and death, exposure to projectiles and damage to property	flammable paints and solvents in contact with an ignition source combustible dusts used powder coating
Confined spaces	exposure to hazardous chemicals, unsafe oxygen levels, potential for fire, explosion and engulfment	spraying inside the cavity of vehicles, ships, aircraft or tanks
Machinery and equipment	injection injuries, being caught by moving parts of machinery can cause fractures, bruises, lacerations, dislocations, permanent injuries or death	spray booths, sanding, grinding equipment, airless spray equipment, compressed air
Working at height	falling objects, falls, slips and trips of people can cause fractures, bruises, lacerations, dislocations, concussion, permanent injuries or death	spray painting trucks, ships, aeroplanes or bridges
Hazardous manual tasks	overexertion, sustained awkward postures or repetitive movement can cause muscular strain	repetitive spraying action, lifting and pushing objects into place

Electricity or static electricity	• exposure to electricity can cause shock, burns or death from electric shock • electricity and static electricity are also sources of ignition	the use of electrical equipment, wiring of equipment and electrostatic charges
Heat or high humidity	exposure to heat or high humidity can cause burns, heat stroke and fatigue	wearing impervious PPE or working outdoors or in a poorly ventilated workplace
Noise	exposure to loud noise can cause permanent damage to hearing	noise from pumps, compressors and spray booths

Identifying the chemicals used in the workplace

Exposure to hazardous chemicals is a significant risk in spray painting and powder coating activities including during preparation (preparing surfaces, tinting, mixing and pouring paints), storage, clean-up and disposal. The hazardous chemicals that workers may be exposed to include paints, solvents, powders, lacquers, paint strippers, adhesives, surface preparation products, rust converters and rust removers. In most cases the product label and SDS will identify any hazardous chemicals.

You should also identify any dusts or fumes generated by sanding and surface preparation. For example, sanding of polyurethane paints that are not fully cured can generate dust containing unreacted isocyanides which can lead to long term respiratory problems.

WHS Regulation section 351: A PCBU must manage risks to health and safety associated with using, handling, generating or storing a hazardous chemical at the workplace.

Identifying the hazards of the chemicals

The health effects that a worker may experience following exposure to hazardous chemicals can become apparent after a short period of time and include headaches,

nausea or vomiting, dizziness burns to the skin or eyes and irritation to the nose, throat and lungs. Serious long term health effects where the symptoms may not be immediately apparent can also occur. Long term health effects include asthma, dermatitis, kidney or liver damage, cancer and damage to the reproductive system and central nervous system. Many chemicals used in spray painting or powder coating also have physicochemical hazards. For example, many organic solvents are flammable and some chemicals used for cleaning or surface preparation may be corrosive.

Information about the hazards of chemicals is available from product labels and safety data sheets. A SDS includes information on the health effects, physicochemical properties, safe handling and storage, emergency procedures, and disposal considerations. It also contains information about how hazardous chemicals can enter the body (e.g. by inhalation into the lungs, absorption through the skin and eyes and through swallowing including accidently ingesting small amounts).

If you don’t have a SDS for a hazardous chemical supplied to your workplace, you must obtain one from the manufacturer, importer or supplier of the chemical. You should also consider obtaining a current SDS before you decide to purchase a new chemical as it is useful to identify hazards Before you potentially introduce them into your workplace.

Toxic substances

Biologic pollutants include bacteria, molds, viruses, animal dander, cat saliva, dust mites, cockroaches, and pollen. These biologic pollutants can be related to some serious health effects. Some biologic pollutants, such as measles, chickenpox, and influenza are transmitted through the air. However, the first two are now preventable with vaccines. Influenza virus transmission, although vaccines have been developed, still remains of concern in crowded indoor conditions and can be affected by ventilation levels in the home.

Allergic Health Effects.

Many molds produce numerous protein or glycoprotein allergens capable of causing allergic reactions in people. These allergens have been measured in spores as well as in other fungal fragments. An estimated 6%–10% of the general population and 15%–50% of those who are genetically susceptible are sensitized to mold allergens. Fifty Percent of the 937 children tested in a large multicity asthma study sponsored by the National Institutes of Health showed sensitivity to mold, indicating the importance of mold as an asthma trigger among these children . Molds are thought to play a role in asthma in several ways. Molds produce many potentially allergenic compounds, and molds may play a role in asthma via release of irritants that increase potential for sensitization or release of toxins (toxins) that affect immune response.

Self-Check – 7	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

1. Explain abate hand tool safety?

2. What is hand tool safety?

Test

.

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

LAP TEST	Performance Test

Name…… ID……Date……

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **3** hour. The project is expected from each student to do it.

Task 1: performing paint mixing

LG #23	LO #2- Clean vehicle body exterior paint

Instruction sheet

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

Selecting and using Tooling and equipment according to workplace methods and customer requirements. Flexible drive appliances, Selecting materials according to vehicle finish type

Using and storing materials according to manufacturer/ component supplier recommendations and regulatory requirement,Cleaning vehicle body exterior finish according to workplace and industry/product manufacturer/component supplier prescribed methods and procedures, Completing cleaning without causing damage to system components, Cleaning vehicle body exterior paint according to industry standards/regulations/guidelines, WHS requirements, legislation and enterprise procedures/ policies

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

Select and use Tooling and equipment according to workplace methods and customer requirements. Flexible drive appliances, Selecting materials according to vehicle finish type

Use and store materials according to manufacturer/ component supplier recommendations and regulatory requirement, Cleaning vehicle body exterior finish according to workplace and industry/product manufacturer/component supplier prescribed methods and procedures, Complete cleaning without cans damage to system components, Cleane vehicle body exterior paint according to industry standards/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 below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test

Information Sheet 1.Selecting and using Tooling and equipment according to workplace methods and customer requirements.

1.1. Cleaning Tools

Car cleaning and detailing involves the application and removal of various solutions throughout the vehicle. Common application and removal supplies include wash mitts, sponges, brushes, towels, squeegees, dusters, foam applicators, buffing pads and more. The appropriate tools will vary with the part and the process involved.

There are three key rules when it comes to car cleaning tools. First, only use tools made of materials that will not scratch the surface being cleaned. Second, rinse or swap out dirty tools for clean ones frequently during the cleaning process. And finally, clean the tools thoroughly when done; brushes should be thoroughly rinsed, and tools made of fabric can be run through a washing machine.

Fig-14 A selection of car cleaning tools.

Car cleaning has traditionally been done using mitts and towels made of 100 percent cotton, or wool in the case of some wash mitts. These tools remain common, but newer versions made of microfiber fabric are increasingly popular due to their superior absorbency and contaminant removal properties.

Power Buffers

Many vehicle owners apply and remove vehicle polishes and waxes by hand, but a power buffer can make these tasks easier. Professional detailers use rotary buffers with powerful motors that spin an applicator or buffing pad in a circular motion. These tools are very effective, but if used improperly can leave swirl marks, burn the vehicle finish

or cut through the paint — particularly on body panel edges and other areas where there are sharp bends or creases in the surface

Fig-15- A rotary car polishes

Underbody Cleaning

Removing dirt and other deposits from inside wheel wells and under the car helps prevent rust and corrosion. This is particularly true on vehicles driven off road, in muddy conditions, or where salt and other chemicals are used to melt ice and snow.

Fig-16 automatic car wash Washing

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

1.

Test I. Choose the best answer for the following question

Note: Satisfactory rating - 8 points Unsatisfactory - below 8 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Test I

1. ---------- 2. --------- 3. ----------

Information Sheet 2- Selecting materials according to vehicle finish type

2.1. Introduction

EQUIPMENT AND MATERIAL

Spraying a vehicle is a skilled job. It calls for considerably more experience and knowledge than just holding down the trigger and moving the gun. There are several variables contributing to the quality of a spray finish, including spraying material viscosity, spray booth temperature, film thickness, and spray method.

The proper painting environment must address six variables:

- Cleanliness—to keep dirt out of paint
- Temperature/humidity—to provide proper paint curing or drying conditions
- Light—to properly illuminate the vehicle and paint as it is applied
- Compressed air—to send clean air at the right pressure to the gun
- Controlled ventilation—to ensure the health of workers
- Fire safety—to protect the shop and employees

There are many ways to keep dirt and other contaminants from becoming a problem in a paint or finish. Before beginning a refinish operation, you must prepare (prep) The equipment, refinish materials, and paint area

PAINT MIXING STICKS

Graduated paint mixing sticks have conversion scales that allow you to easily convert ingredient percentages into part proportions. They are used by painters to help mix paints, solvents, catalysts, and other additives right before spraying. Almost all shops have paint mixing sticks. Detailed instructions for using paint mixing sticks are given in Chapter

VISCOMETERS

The most accurate way to measure material viscosity is with a viscometer, or viscosity cup. The two types of viscometers used for automobile painting are the Ford cup And the Zahn cup. Although the Ford cup is very accurate, it is too expensive for the average collision repair shop. The Zahn cup is less expensive and almost as accurate.

When preparing a refinish material for spraying, thin it to the proper viscosity according to the directions on the can, using the reducer or thinner best suited for the shop temperature and conditions. Various automotive finish materials are manufactured to spray at ideal viscosities. Refer to the label on the material container to find the recommended viscosity.

Job description	Recommended painter protection
Wet sanding Car washing	
Solvent wax removal Stripping/paint removal	
Machine sanding Blowing	
Buffing Polishing	
Primers (noncatalyzed) lacquer and enamel type	
Spraying (noncatalyzed) lacquers and enamels	
All catalyzed primers and paints	
Paint and primer mixing Wet paint job inspection	

SPRAY GUN AIR SUPPLY

Make sure the air compressor and the in-line filters are drained of water. Many compressors and filters now have an automatic drain that does not require periodic maintenance Some air compressors and filters, however, require manual bleeding. You must open the drain valve on the bottom of the compressor tank or filter to bleed out condensation or moisture. The compressed air system can be a source of problems for the painter. Air supply system problems can introduce dirt, moisture, and oil into the air supply. From there, these substances can contaminate the paint.

- To avoid air supply and painting problems:
- Check and replace oil and water filters and traps on a regular basis.

- If the system is not automatic, drain moisture from it daily. Draining the system in the morning allows more moisture to be removed because it is cool and has condensed.

Information Sheet 3. Using and storing materials according to manufacturer

Storing materials

The workplace or office is a place where productivity is expected and having a pleasant work area certainly adds to a positive environment. Employees can do their part in addition to regular cleaning staff housekeeping and caretaker maintenance to keep it clean, safe, and healthy for all.

Collecting and storing material that can be reused

The proper care and storage of materials, tools and equipment's are not only the concern of the management but of the workers who use the equipment.

A major responsibility of the technician is to ensure that materials, tools and equipment are maintained in a good condition and are readily available when required for the various work activities. Faulty tools and equipment's are a common reason for delays on technical activities.

Good organization of stored materials is essential for overcoming material storage problems whether on a temporary or permanent basis. There will also be fewer strain injuries if the amount of handling is reduced, especially if less manual materials handling is required. The location of the stockpiles should not interfere with work but they should still be readily available when required. Stored materials should allow at least one meter (or about three feet) of clear space under sprinkler heads.

Fig 17 storing material

Importance of proper storage of tools and equipment's

- It is important factor for safety and health as well as good business.
- Improves appearance of general-shop and construction areas.
- Reduce overall tool cost through maintenance.
- This also ensures that tools are in good repair at hand.
- Teaches workers principles of tool accountability.

Pointers to follow in storing tools and equipment's

- Have a designated place for each kind of tools.
- Label the storage cabinet or place correctly.
- Store them near the point of use.
- Wash and dry properly before storing.
- Store sharp edge materials properly when not in use with sharp edge down.
- Put frequently used items in conveniently accessible conditions.
- Gather and secure electrical chord to prevent entanglement or snagging.
- Cutting boards should be stored vertically to avoid moisture collection
- Metal equipment's can be stacked on one another after drying.
- Make sure the areas where you are storing the equipment are clean, dry and not overcrowded.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: give short answer

1. Define Storing materials. (6)

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

You can ask you teacher for the copy of the correct answers.

Answer sheet

Test I

Score = _____
Rating: _____

Information Sheet 4. Cleaning vehicle body exterior finish

1.4. Exterior Cleaning

With proper care, it is possible to keep a vehicle's exterior looking at least as good as The day it rolled off the assembly line, and sometimes even better. Basic exterior cleaning involves a simple wash and wax, but depending on the condition of the vehicle finish, and the desired final outcome, exterior car cleaning can be a far more involved process as shown in the accompanying flow chart.

Pre-Washing

Washing a vehicle removes surface contaminants that detract from appearance and over time can damage the paint. Before washing, open the doors, hood, sunroof, and trunk or hatchback and clear away any leaves, twigs or other debris around the openings. The underwood area at the base of the windshield is a common collection point. Follow up by using a microfiber towel wetted with a car washing detergent solution to wipe clean the normally hidden areas of these openings, along with any rubber seals and weather stripping. This is also a good time to make sure the drain openings on the bottoms of doors and hatches are not blocked. These small holes allow any water that gets inside to escape, which helps prevent rust and corrosion. If any drains are blocked, clear them with a non- scratching tool, then flush the openings with low-pressure water from a hose until clear water runs freely from all of the drains.

Fig-18- Road tar thrown up by the tires can create a mess on a car's finish

2.1. Washing

Common car washing tools include buckets, sponges, mitts and brushes. Better car wash buckets have a raised grid or “grit guard” in the bottom that allows dirt and other contaminants to settle out of the water, keeping them off sponges and mitts. When selecting washing tools, look for: large-pore, natural or synthetic sponges; soft synthetic or animal hair brushes; and wool, 100-percent cotton or microfiber wash mitts with a deep nap that will pick up dirt while being gentle on paint. Finally, always use automotive-specific washing products, not dishwashing detergent or other household cleaners that often contain chemicals and abrasives that can strip wax and damage paint or other parts.

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: give short answer

1. Explain about Pre-Washing?(6)

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

You can ask you teacher for the copy of the correct answers.

Answer sheet

Test I

Score = _____
Rating: _____

Information Sheet 5- Completing cleaning without causing damage to system components

Drying

To prevent water spots a car should be dried immediately after washing. Drying tool options include blowers, squeegees, chamois and towels. A car-drying blower is similar to a vacuum cleaner being run in reverse; it uses a powerful stream of filtered air to clear water from the surface. Soft silicone-rubber squeegees designed for drying cars can quickly clear standing water from large smooth areas, but are less effective in other locations. While generally helpful, both these tools leave residual water that will require final drying with a chamois or towel. Some professionals also dislike them because they can force or drag dislodged contaminants across the paint surface. Chamois is soft, smooth leather originally made from hides of the Chamois, a goat- antelope species native to some mountains in Europe. Today, chamois is made from the hides of deer, goats, sheep and even pigs although, in the United States, the term *chamois* without qualification legally describes only sheep or lambskin tanned solely with oils. Chamois is extremely water absorbent and leaves no streaks, making it ideal for drying glass. However, professional detailers generally don't use chamois to dry paint because, like blowers and squeegees, it can drag abrasive particles across the surface. Cotton towels are the traditional tool for drying cars because they will pick up and trap any remaining loose contaminants as the car is dried.

Fig--Drying

Information Sheet 6- Cleaning vehicle body exterior paint according to WHS

Car Wash Safety

According to the International Car Wash Association, there are more than 100,000 car washes in North America employing about 625,000 people. Serious injuries can occur in car wash operations such as electrocutions, chemical burns, lacerations, amputations, strains, struck-by moving vehicles, assaults and slips and falls. However, there are many precautions that can be taken to eliminate or significantly reduce such injuries. A written, site-specific safety program should be developed and implemented. This program should have instructions and procedures that are task specific for employees to follow. Specific safety training should be provided to all employees. The training should include new hire orientation, specific on-the-job training, and periodic refresher training. Employees should be instructed to inspect equipment regularly and report any unsafe conditions to their supervisors immediately. A preventive and corrective maintenance program should also be in place to ensure that all equipment is in good condition.

GENERAL SAFETY

Electrical Hazards

To reduce the possibility of severe injury or death from electrical shock, employees should not conduct any repairs unless they are qualified and authorized by the company. Lockout/tag out procedures should be followed when servicing or maintaining equipment. The following precautions should be followed when using portable/powered tools:

Ensure all electrical tools have double insulation

- Do not use a tool that does not have a ground prong.
- Install "point-of-use" ground fault interrupter (GFI) electrical receptacles for use in all tunnel and bay areas
- Do not use tools or extension cords that have splices or exposed wires

- Do not handle or operate electrical equipment when hands are wet or when standing on wet floors

CHEMICAL HAZARDS

Caution should be exercised in handling all chemical products. Some car wash chemicals are caustic and should not come in direct contact with bare skin or eyes.

Read caution labels on any chemical products. Read and understand the MSDS (Material Safety Data Sheet) for each chemical product used. These sheets provide important information regarding safe use, personal protective equipment, storage and first aid. Follow the company hazard communication program.

SLIPS AND FALLS

Good housekeeping is essential to a safe workplace and may result in fewer accidents and reduced fire hazards. Remove tools, materials or other objects lying on floors, driveways, and work areas. Clean up all spills such as oil, detergent, wax, etc. Drain trenches must be kept clean to minimize the amount of excess water on the floor. Employees should wear slip-resistant shoes. Employees should receive training in correct ladder selection, inspection and safe use. For further information or assistance, contact your Zenith Safety and Health Consultant.

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: give short answer

2. What is cleaning vehicle body. (6)

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

You can ask you teacher for the copy of the correct answers.

Answer sheet

Test I

Score = _____
Rating: _____

LAP TEST	Performance Test

Name…… ID……Date……

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **3** hour. The project is expected from each student to do it.

Task 1: Performing Clean vehicle body exterior paint method

LG #24	LO #3- Polish vehicle body exterior paint

Instruction sheet

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

Identifying surface materials and finish requirements, Identifying Hazards, Installing and set-up polishing heads, Finishing Job surface to enterprise requirements, Completing all finishing procedures within recognised enterprise, Polishing Work without causing damage to any system component, Carrying out all activities are according to industry regulations/guidelines, WHS legislation, and enterprise procedures/policies., Selecting and using Tooling and equipment according to workplace methods and customer requirements, Selecting Materials according to vehicle finish type, workplace methods and paint manufacturer/component supplier recommendations, Using and storing materials according to manufacturer/ component supplier recommendations and regulatory requirements, Polishing Vehicle body exterior paint according to workplace, and industry/product manufacturer/component supplier prescribed methods and procedures, Completing polishing out causing damage to component or system, Polishing Vehicle body exterior finish according to industry standards/regulations/guidelines, WHS requirements, legislation and enterprise procedures/ policies.

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

Identify surface materials and finish requirements, Identifying Hazards, Install and set-up polishing heads, Finish Job surface to enterprise requirements, Completing all finish procedures within recognized enterprise, Polish Work without causing damage to any system component, Carry out all activities are according to industry regulations/guidelines, WHS legislation, and enterprise procedures/policies., Select and using Tool and equipment accord to workplace methods and customer requirements, Select Materials according to vehicle finish type, workplace methods and paint manufacturer/component supplier recommendations, Use and storing materials according to manufacturer/ component supplier

recommendations and regulatory requirements, Polish Vehicle body exterior paint accord to workplace, and industry/product manufacturer/component supplier prescribed methods and procedures, Complete polish out cause damage to component or system, Polish Vehicle body exterior finish accord to industry standards/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 below. 3. Read the information written in the information Sheets 4. Accomplish the Self-checks 5. Perform Operation Sheets 6. Do the “LAP test”

Information Sheet 1- Identifying surface materials and finish requirements

1.1. Finishing Materials

A wide variety of materials are used in aircraft finishing .Some of the more common materials and their uses are described in the following paragraphs.

Acetone

Acetone is a fast-evaporating colorless solvent. It is used as an ingredient in paint, nail polish, and varnish removers. It is a strong solvent for most plastics and is ideal for thinning fiberglass resin, polyester resins, vinyl, and adhesives. It is also used as a superglue remover. Acetone is a heavy-duty degreaser suitable for metal preparation and removing grease rom fabric covering prior to doping. It should not be used as a thinner in dope because of its rapid evaporation, which causes the doped area to cool and collect moisture. This absorbed moisture prevents uniform drying and results in blushing of the dope and a flat no-gloss finish.

Alcohol

Butane, or butyl alcohol, is a slow-drying solvent that can be mixed with aircraft dope to retard drying of the dope film on humid days, thus preventing blushing. A mixture of dope solvent containing 5 to 10 percent of butyl alcohol is usually sufficient for this purpose. Butane and ethanol alcohol are mixed together in ratios ranging from 1:1 to 1:3 to use to dilute wash coat primer for spray applications because the butyl alcohol retards the evaporation rate. Ethanol or denatured alcohol is used to thin shellac for spraying and as a constituent of paint and varnish remover. It can also be used as a cleaner and degreaser prior to painting. Isopropyl, or rubbing alcohol, can be used as a disinfectant. It is used in the formulation of oxygen system cleaning solutions. It can be used to remove grease pencil and permanent marker from smooth surfaces, or to wipe hand or fingerprint oil from a surface before painting.

Benzene

Benzene is a highly flammable, colorless liquid with a sweet odor. It is a product used in some paint and varnish removers. It is an industrial solvent that is regulated by the Environmental Protection Agency (EPA) because it is an extremely toxic chemical compound when inhaled or absorbed through the skin. It has been identified as a Class A carcinogen known to cause various forms of cancer. It should be avoided for use as a common cleaning solvent for paint equipment and spray guns.

Methyl Ethyl Ketone (MEK)

Methyl ethyl Ketone (MEK), also referred to as 2-Butanone, is a highly flammable, liquid solvent used in paint and varnish removers, paint and primer thinners, in surface coatings, adhesives, printing inks, as a catalyst for polyester resin hardening, and as an extraction medium for fats, oils, waxes, and resins. Because of its effectiveness as a quickly evaporating solvent, MEK is used in formulating high solids coatings that help to reduce emissions from coating operations. Persons using MEK should use protective gloves and have adequate ventilation to avoid the possible irritation effects of skin contact and breathing of the vapors.

Methylene Chloride

Methylene Chloride is a colorless, volatile liquid completely miscible with a variety of other solvents. It is widely used in paint strippers and as a cleaning agent/degreaser for metal parts. It has no flash point under normal use conditions and can be used to reduce the flammability of other substances.

Toluene

Referred to as Toulon or methylbenzene, toluene is a clear, water-insoluble liquid with a distinct odor similar to that of benzene. It is a common solvent used in paints, paint thinners, lacquers, and adhesives. It has been used as a paint remover in softening fluorescent-finish, clear topcoat sealing materials. It is also an acceptable thinner for zinc chromate primer. It has been used as an ant knocking additive in gasoline. Prolonged exposure to toluene vapors should be avoided because it may be linked to brain damage.

Turpentine

Turpentine is obtained by distillation of wood from certain pine trees. It is a flammable, water-insoluble liquid solvent used as a thinner and quick-drier for varnishes, enamels, and other oil-based paints. Turpentine can be used to clean paint equipment and paint brushes used with oil based paints.

Mineral Spirits

Sometimes referred to as white spirit, Stoddard solvent, or petroleum spirits, mineral spirits is a petroleum distillate used as a paint thinner and mild solvent. The reference to the name Stoddard came from a dry cleaner which helped to develop it in the 1920s as a less volatile dry cleaning solvent and as an alternative to the more volatile petroleum solvents that were being used for cleaning clothes. It is the most widely used solvent in the paint industry, used in aerosols, paints, wood preservatives, lacquers, and varnishes. It is also commonly used to clean paint brushes and paint equipment. Mineral spirits are used in industry for cleaning and degreasing machine tools and parts because it is very effective in removing oils and greases from metal. It has low odor, is less flammable, and less toxic than turpentine.

Naphtha

Naphtha is one of a wide variety of volatile hydrocarbon mixtures that is sometimes processed from coal tar but more often derived from petroleum. Naphtha is used as a solvent for various organic substances, such as fats and rubber, and in the making of varnish. It is used as a cleaning fluid and is incorporated into some laundry soaps. Naphtha has a low flashpoint and is used as a fuel in portable stoves and lanterns. It is sold under different names around the world and is known as white gas, or Coleman fuel, in North America.

Linseed Oil

Linseed oil is the most commonly used carrier in oil paint. It makes the paint more fluid, transparent, and glossy. It is used to reduce semi paste oil colors, such as dull black stenciling paint and insignia colors, to a brushing consistency. Linseed oil is also used as a protective coating on the interior of metal tubing. Linseed oil is derived from

pressing the dried ripe flax seeds of the flax plant to obtain the oil and then using a process called solvent extraction. Oil obtained without the solvent extraction process is marketed as flaxseed oil. The term “boiled linseed oil” indicates that it was processed with additives to shorten its drying time. A note of caution is usually added to packaging of linseed oil with the statement, “Risk of Fire from Spontaneous Combustion Exists with this Product.” Linseed oil generates heat as it dries. Oily materials and rags must be properly disposed after use to eliminate the possible cause of spontaneous ignition and fire.

Information Sheet 2- Identifying Hazards.

2.1. Introduction

Hazard: Anything (e.g. condition, situation, practice, behavior) that has the potential to cause harm, including injury, disease, death, environmental, property and equipment damage. A hazard can be a thing or a situation.

Hazard Identification: This is the process of examining each work area and work task for the purpose of identifying all the hazards which are “inherent in the job”. Work areas include but are not limited to machine workshops, laboratories, office areas, agricultural and horticultural environments, stores and transport, maintenance and grounds, reprographics, and lecture theatres and teaching spaces. Tasks can include (but may not be limited to) using screen based equipment, audio and visual equipment, industrial equipment, hazardous substances and/or teaching/dealing with people, driving a vehicle, dealing with emergency situations, construction. This process is about finding what could cause harm in work task or area.

Risk: The likelihood, or possibility, that harms (injury, illness, death, damage etc) may occur from exposure to a hazard.

Risk Assessment: Is defined as the process of assessing the risks associated with each of the hazards identified so the nature of the risk can be understood. This includes the nature of the harm that may result from the hazard, the severity of that harm and the likelihood of this occurring.

Risk Control: Taking actions to eliminate health and safety risks so far as is reasonably practicable. Where risks cannot be eliminated, then implementation of control measures is required, to minimize risks as far as is reasonably practicable.

A hierarchy of controls has been developed and is described below to assist in selection of the most appropriate risk control measure/s.

Monitoring and Review: This involves ongoing monitoring of the hazards identified, risks assessed and risk control processes and reviewing them to make sure they are working effectively.

Responsibilities

Effective risk management requires the commitment to WHS from managers and Officer as well as the input and involvement of workers. It is the responsibility of all managers and supervisors to ensure that this policy is fully implemented in their area(s) of control and to consult with workers as part of undertaking the hazard identification, risk assessment and control process.

It is the responsibility of workers to cooperate and comply with this policy. This includes providing effective and constructive information and feedback to aid the risk management process. Officers have a responsibility to ensure that the areas under their control are complying with legislative requirements. This includes the Officer understanding the hazards and risks associated with their operations and ensuring that Appropriate resources and processes are in place to eliminate or minimize these risks.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: give short answer

1. What is Hazard? (6)

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

You can ask you teacher for the copy of the correct answers.

Answer sheet

Test I

Score = _____
Rating: _____

Information Sheet 3- Installing and set-up polishing heads

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1.1. Polish, Glaze and Paint Sealant

Polishes are mild abrasive cleaners that come in a variety of strengths for various needs. A car with a badly weathered finish that has been restored with buffing compound will typically have swirl marks in the paint. A swirl-removing polish would be used to remove these marks, followed by an even milder finishing polish that will leave the surface ready for the protective steps. These products can also be used as the starting point for restoring finishes that are only moderately deteriorated.

Even a car with a relatively good finish may have minor scratches and swirls in the outer surface. On these vehicles, a pre-wax cleaning polish will remove old wax, minor surface imperfections, light oxidation and water spots, leaving the finish ready for the next step. For the ultimate vehicle finish, two additional processes can be performed before waxing the paint. First, apply a glaze, which is a final cleaner that typically contains wax or other “fillers” to conceal micro scratches in the paint surface. Then, apply a paint sealant that “locks in” the treatments to this point and makes the surface finish more durable and long lasting.

Wax and Detailing Spray

Car waxes offer an outer layer of protection against the environment, but they also provide the deep and vivid shine that makes a car stand out. Waxes come in paste, cream and liquid forms, and can be made of synthetic and/or natural ingredients. Many newer synthetic polymer waxes do an outstanding job and are often easier to apply and remove. However, some professionals maintain that nothing can beat the hardness and shine of natural carnauba wax, although it is more challenging to work with.

Fig-18 Wax Cleaning

Interim Cleaning

In between periodic washing and waxing, pollen and dust particles that collect on the finish can be wiped away using a cotton car duster. For added protection, and to help maintain the finish, this can be followed up with liquid wax or “quick detailer” that is sprayed on and wiped off with a cotton or microfiber towel. The chemicals in these cleaners help lift contaminants off the surface so they can be safely removed. Similar products are available for “waterless” car washing in winter climates or areas that have water use restrictions in effect.

Body Trim Care

Body trim is not just decorative; it includes functional components such as bumpers, handles, and seals for windows and doors. If not properly cared for, the trim will become dirty, worn or damaged, which detracts from appearance and may even interfere with proper vehicle operation. The trim material will dictate how it is cleaned. A damp rag is often sufficient, and a mild car wash detergent solution and soft brushes can help remove more stubborn deposits. Chemical cleaners should be used with caution; a product intended for cleaning one type of trim may cause permanent damage to others. Always carefully read and follow the directions on trim cleaning solutions.

Plastic trim – A good portion of every vehicle is made from some form of plastic, and exterior trim made of these materials is often the first to weather and deteriorate. Once

the surface is washed and dried, apply a suitable cleaner/protector ant that shields against UV light.

- **Rubber trim** – Rubber trim pieces serve as bumpers and moldings that are used to protect and seal windows, doors and other components. When not maintained, rubber trim will look chalky, get stiff and brittle, and eventually crack or tear. Once the surface is clean and dry, use a cloth to apply a rubber restoration or protective dressing. Never spray aerosol protector ants directly onto rubber components as some propellants can cause damage. With door seals, make sure the body surfaces they contact are smooth and clean as well.
- **Black trim** – Black trim (other than rubber parts) is usually plastic, anodized aluminum or painted metal. When the surface is dry, treat the part with an appropriate protector ant designed for the part's finish, generally either matte or gloss. Special cleaners and dyes are available to restore black trim that has a faded or chalky appearance. Some newer polymer waxes can also be used to treat and protect black trim, but make sure the product label recommends such use.
- **Metal trim** – Metal trim can be chrome, aluminum, or stainless steel. Use polish specifically made for the material, and applies with a soft cloth. If chrome trim develops minor rust spots, they can often be removed with polishing compound or, in the hands of a professional detailer, extra-fine steel wool.

- **Headlight lenses** – Use special care when cleaning polycarbonate plastic headlight lenses because they scratch easily. If the lenses are clouded or hazy, they can be restored using a do-it-yourself kit from an auto parts store, or by taking the car to a headlight restoration specialist. Either way, the final step should be application of a protective coating to seal and protect the refinished surface.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: give short answer

1. What is Polishes? (6)

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1.4. Finishing Previously Painted Vehicles

BASF recommends applying refinish products over Original Equipment finishes or previously refinished vehicles only when that finish is sound. Considerations to determine if a substrate is sound include the appearance, hardness, solvent sensitivity, sand ability, blistering and corrosion. Each refinish job should be carefully inspected to determine the correct paint preparation process. If there are any doubts about the soundness of the existing finish, it should be removed.

To achieve the best performance, the total film builds after refinish should not exceed 12 mils (300 microns). Existing finishes should be completely removed or sanded down to an acceptable thickness if the total film build thickness after refinishing would exceed 12 mils (300 microns).

Molding / Trim Removal

Removing moldings will improve the appearance of a repair and ensure it is undetectable. To obtain proper adhesion, existing paintwork must be thoroughly cleaned and sanded before applying repair paint. This can be difficult or even impossible if the moldings are not removed. Also, painting right up to a molding can leave a paint edge that is visible after the repair is completed. Moldings should be removed whenever possible to ensure the repair looks and performs the same as the original finish.

Masking

To prevent overspray settling on undamaged parts of the vehicle, the entire vehicle should be covered during priming and painting operations. To minimize dirt in the final finish, all masking materials used in the priming operation should be removed and replaced with clean masking material prior to basecoat and clear coat application.

Under hood Repair Process

BASF recommends applying catalyzed solvent borne basecoat without clear coat to the under hood and other interior areas that originally were not finished in the exterior

BC/CC system. This system produces the same color tone, gloss and physical performance characteristics as the OEM finish. When using waterborne basecoats, the color is mixed with a tin table, transparent, two-component sealer to achieve the desired finish characteristics.

Glass Adhesion to Repaired Areas

To ensure the proper adhesion of glass to repaired areas, BASF recommends masking off the area where the glass-bonding material will be applied so that no repair paint is applied over that surface. If a repair is required in this bond area, it should be properly repaired and any bare metal should be primed with a two-component epoxy primer only. No other coatings should be applied over the epoxy primer.

Use of Ground Coats

The use of a colored ground coat under the primary color is becoming increasingly necessary for proper automotive refinish repair due to the increased use of transparent coatings by automotive manufacturers. More transparent coatings provide the high Chroma and depth wanted by color designers and the modern consumer.

There are two main areas where ground coats are a vital part of the refinish repair process. The first is with three-stage color formulations, also referred to as “tri-coats.” These are colors that are styled with an opaque ground coat, followed by a transparent mid-coat, usually mostly containing mica, then completed with a high-gloss clearcoat. The ground coat is an integral part of the color styling and has a direct effect on the color as the mid-coat is very translucent. In these cases, the use of a step panel is recommended to determine the proper amount of mid-coat, to be applied for proper color-match. The second use of ground coats is when the color coat is very translucent, often with high levels of mica and/or transparent pigments. In the factory, these are applied over color-coded primers so that the proper film build is achieved in the plant. The color is not applied to hiding in most cases. Therefore, to achieve a proper color-match during the repair & refinish process, use of a ground coat that simulates the color-coded primer used in production is required to ensure the proper film build of the color coat. The use of the required ground coat color is required to achieve color-match of translucent colors, and cannot be achieved with additional coats of basecoat only.

The proper use of ground coat improves color-match and reduces film build to maximize performance and durability of refinish materials. Ground coat colors required for color-match are included in BASF's color information when referencing the color formula

Single Stage Finishes

BASF offers single-stage finishes that are matched to some solid color BC/CC OEM finishes. These Finishes can be used as an economical alternative for the repair of older vehicles. They will not, however, offer the same level of durability as a BC/CC finish.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

1. explain how to Molding / Trim Removal

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

Information Sheet -5- Completing all finishing procedures within recognised enterprise

Measurement of paint

Measurement of paint is done in square meter up to two decimal points. Straight measurements are multiplied with their multipliers according to those given in the table below, and then the area for payment is calculated. (See table 13.3). While taking measurement only length and width are measured and not the curves. Measurement of collapsible gate is done by taking the length and width of that place where the gate is fixed, without opening it fully; other measurements are done in the same manner.

Parts of doors and windows are measured in straight and not in curve and these are measured along with the frame. For collapsible gate, it is opened fully and measured from outside. No measurement is taken separately for any channel etc. similarly if there is any hood or cover is fitted on the top then separate measurement is taken for that.

For the doors or roofs (cement or iron) made of piped sheets, measurement is taken in straight line and not in circular curve. Molding or hand railing is measured in curve. In the case of Truss, girders etc., measurement is made in terms of length breadth which will be in square meter. No payment is made for any extra things. Painting of Rain water pipes or any other such type of pipes is done in running meters. Clamps are included in this. Painting of wall is done with exact measurements. Chimneys or scaffoldings are measured separately. All measurements are done up to one centimeter.

In order to calculate the area painted or different surfaces, the following table should be consulted. Complete area is calculated after multiplying it with the multiplier given on the right side of the table.

Painting work on wood

A painting coat is applied first on the wooden surface. Now a days it comes readymade, otherwise it can also be made at the site. For this red lead, white lead and double boiled linseed oil is mixed in the ratio of 0.70 Kg per liter. New or old sand paper is used for rubbing the wooden surface, cleaning the dust with a clean cloth and then the primer is applied. After this the paint to be used should be of standard company and of I.S.I. marked. Second coat is applied only after the first coat becomes dry. Now a day's

quality enamel paint is made thin by mixing thinner into it and then it is applied through spray gun, like it is done on the cars and other vehicles

Painting on iron steel

Just like the wooden work, a primer coat is initially applied on the iron/steel surface. Normally it comes ready made from the market. It is also made by mixing red lead and raw linseed oil in the ratio of 2.80 kg/liter with the turpentine oil and is made ready at the site with thin consistency. After primer coat, any type of paint, can be applied but it should be of good company. While painting the iron/steel surface, it should be kept in mind that before starting the painting, the surface which is already cleaned, it cleaned again with waste cotton or clothes, before being painted because there is oxygen in the air which reacts with iron and an iron oxide layer gets deposited on the iron surface in a very short time, which is known as rust as the time passes.

Painting on the plastered surface

Polish on wood

The surface is first cleaned with thin and then with thick sand paper and then a coat is applied by mixing chalk powder and color. After filling putti and then again sand paper is used. This sequence is repeated for 2-3 times. When the surface becomes smooth completely, a pad is made by folding a very thin cotton cloth and then first coat is applied by dipping the pad in the polish solution.

After drying, fine sand paper is used and then again the layer of polish is applied with the help of the pad. In the second and third phase, final coat of polish is applied and left for drying. It should be remembered while applying the coats of paint or polish that dust should not come on the surface from the surrounding area. Otherwise, dust particles will be deposited on the surface along with the drying of the polish and the labour along with the material will be wasted and this will cause monitory loss. If walls are to be painted with plastic paint, then remember that putti made of oil should never be applied on the surface below that.

VARNISHING

The wooden surface is first cleaned and if there are any holes, then a thin layer of gum is applied on these and wooden dust is applied over this to fill these holes. When this becomes dry, thin sand paper is used for rubbing this and then the first layer of varnish is applied. When first layer becomes dry then second layer of varnish is applied.

SPIRIT POLISH

Clean and clear sealing wax (Lac) particles which are available in light yellow and orange color are mixed with spirit. The ratio of mixing these two is 140 gram sealing wax (Lac) particles is to one liter spirit

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

1. Explain about finishing procedures?

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

Information Sheet -6- Polishing Work without causing damage to any system component

Introduction

After the completion and making the building infrastructure strong in order to save it and its fittings from the effect of weather, and to give it an attractive look, the plaster, painting and polishing work is to be done.

Cement plaster

Cement plaster is generally used with 13 mm thickness and sometimes it can be of 19 mm thickness also. 19 mm plaster is done in two parts. First layer is of 13 mm and 2nd is of 6 mm thickness. After the 1st layer is set, the slurry of cement of the 2nd layer is applied. Besides the walls, plaster has to be done on the ceiling (lower part of the roof) also sometimes when the shuttering is opened, many holes are found at various places in the ceiling and at some places it is not found to be smooth, then a 6 mm plaster is done in the ratio of 1:3 of cement and sand, respectively. Its curing is done in the same manner as normal cement plaster.

Painting through lime

Lime, which comes in the form of blocks, is converted in to powder form by spraying it on a solid (puce) floor and spraying water on it. This process is called slaking or extinguishing. Later on more water is mixed into it so that it becomes ready in the form of slurry, which can be painted on walls through brushes. In order to make its grasping strong, 5 kg of adhesive is added in 4 cubic meter of lime. Walls are cleared completely and then painted with brush. Generally three coats are done.

For payment, it is calculated on the basis of area which is equal to length width. It is up to two decimal points only.

Color washing

For color wash, the first coat, which is called priming coat is of lime. Then the required color is mixed with lime for doing the second coat.

Dry distemper

One kg distemper of any good brand and 0.6 liter of water is mixed in ratio for about 3 minutes. It will be better if this solution is kept overnight and then is taken for use. In order to maintain the same color throughout the wall, it is necessary that every time you should shake the solution before dipping the brush. Thus its consistency as well as the color can be maintained. Only that quantity of distemper should be mixed with water, which is likely to be consumed in day.

Making the surface ready

The surface on which distemper is to be done is first cleaned with sand paper and made smooth as far as possible. After the plaster gets dried up on the wall for minimum 60 days, only then distemper is to be done. First coat of lime is done on the plastered surface and after those 2 coats of distemper is applied. For doing the distemper on old surfaces, first the surface is cleaned thoroughly and small pits are filled with plaster of Paris mixed with the distemper. Once the wall is made smooth with sand paper then only the distemper is applied.

Oil bound distemper

Cement Primer coat is applied before doing oil bound distemper and all the process of smoothening of the surface is to be done in the same way as dry distemper.

Cement Paint: Cement paint is done only on the outer walls and not on the walls which are already painted. MATERIALS All materials used for paint should be of standard companies. Painting Brush Different size of brushes are used for different applications. For example 7.5 to 10 cm brushes for doors, windows etc. 5 cm brushes for grills and railings and 10 to 15 cm brushes are used for walls.

Maintenance of Brushes

After using brushes these are to be washed thoroughly in Turpentine oil and then kept aside. If the brushes are kept without washing, then they cannot be used again.

Before using new brushes, they should be washed first in soap water and then in clean water and then dried. Before starting the painting work, rest of the jobs should be

finished. Rooms are cleaned completely and then painting work should start. Painting work should not be done in the rainy season or in extreme humidity. The best season for painting is summer season.

Making the surface ready

Before painting, the surface should be cleaned thoroughly, so that any type of dust or any other material or loose particles are not deposited on the surface which is to be painted. Sand paper is used for cleaning purpose. Paint is poured from big drums to small containers. Every time paint is stirred well before taking the paint through brush so that the texture of the paint remains the same. While painting, brush is moved from top to bottom and then from right to left and in the end the brush is slowly moved after bringing it from right to left or from left to right giving light pressure on it. The process so adopted is called one coat and when it gets dried, the same process is repeated which is called second coat. All the work is to be inspected at the site by the site engineer from time to time. Painting is also done through spray machines. In that case the paint is made thin by mixing thinner into it. The surface should be dried before spray. The putti which is applied on the doors and windows in order to give support to the glasses, is also painted with this paint color. But remember that the stains of paint should not be seen on the glass. Generally one coat is done on old works and two coats are done on new works.

PRECAUTIONS

The paint laborers should be warned that they should keep a net on the face while painting and wear rubber gloves in their hands so that they can save themselves from becoming ill.

Information Sheet -7- Carrying out all activities are according to industry regulations

5.1. Introductions

Danish Waste management regulation is characterized by a combination of traditional regulation through laws and executive orders, and a wide range of other instruments such as taxes, fees, subsidy schemes, and agreements.

Plastic waste is presently becoming a focus point nationally and in the municipal collection schemes, leading to a general trend of increased source sorting and collection of plastic waste. Based on a review of the municipal waste directives it is assessed that in 2013, 22 out of the 98 municipalities have established kerbside collection of rigid plastic waste, and in the majority of these, the collection is limited to detached houses. The rigid plastic waste collection schemes in 2013 cover some variations including:

- Collection frequency varies between one and two weeks.
- In few municipalities plastic waste is also collected from apartment buildings (among these Copenhagen, Frederiksberg, and Gladsaxe).
- The plastic waste collected is mainly plastic packaging, but some municipalities collect also other types of rigid consumer plastic waste.
- Some municipalities have voluntary purchase of sorting bins (reducing the more expensive residual fraction).Curbside collection. Source-sorting system in Herlev municipality, Denmark

Flexible plastic waste is collected with the residual waste, but can also be delivered at some municipal collection stations. Flexible PVC is, as the only plastic waste fraction, sent to landfill. The frequency of municipalities with separate collection is likely to increase as several municipalities currently are running pilot tests with household source sorting and collection. One example of these developing arrangements can be found in Aalborg, where the fractions received are:

- Drinking bottles.
- Containers used for shampoo and conditioner.
- Containers used for washing and cleansing agents.

- Plastic bins, tubs, pots, jars, small buckets, and flowerpots.
- Plastic trays used for meat and vegetables.
- Various plastic foils and plastic bags, although not bread bags or plastic that has been in direct contact with food.
- Toys and other plastic articles from households.

The resource plan for waste management (2013–2018), sets up a framework for the municipalities within which the municipalities are in the process of developing appropriated source sorting of household waste, and the frequency of multi-compartment waste bins is increasing.

Plastic bulky waste

Plastic bulky waste is covered by the waste executive order, and is collected at the manned waste collection centers. Bulky waste originating from households is under the responsibility of the municipalities, i.e. all municipalities collect this fraction at the recycling sites. Bulky waste originating from businesses is the responsibility of the companies. The sorted plastic bulky waste is collected and compressed into bales, and send to sorting facilities, mainly in northern Germany and Sweden, though a few facilities does exist in Denmark.

Information Sheet -8- Selecting and using Tooling and equipment according to workplace methods and customer requirements.

Hand tools

Hand tools are tools that are powered manually. Hand tools include anything from axes to wrenches. The greatest hazards posed by hand tools result from misuse and improper maintenance.

Some examples include the following:

- If a chisel is used as a screwdriver, the tip of the chisel may break and fly off, hitting the user or other employees.
- If a wooden handle on a tool, such as a hammer or an axe, is loose, splintered, or cracked, the head of the tool may fly off and strike the user or other employees.
- If the jaws of a wrench are sprung, the wrench might slip.
- If impact tools such as chisels, wedges, or drift pins have mushroomed heads, the heads might shatter on impact, sending sharp fragments flying toward the user or other employees.

When using hand tools

- All hand tools, whether furnished by the department or employee owned, must be maintained in safe condition.
- Hand tools must be inspected before each use. Unsafe hand tools must not be used on any campus worksite.
- Hand tools must be used for the designed purpose.
- Impact tools must be free of mushroomed heads.
- Wooden handles must be free of cracks or splinters and be tight to the tool.
- Wrenches must not be used when jaws are sprung to the point that slippage occurs.
- Electric power operated tools must be double-insulated or properly grounded.

- Appropriate personal protective equipment, such as safety glasses with side shields, face shields, leather work gloves, or leather work boots must be worn when using hand tools.

Using work methods

Work methods are the physical actions employed to perform a task. Evaluating and modifying work methods to prevent discomfort and injury is one of several components of an effective ergonomics program. Work methods are also called work practices

The working method will have to be:

- Clearly explained. It will need to be understood by the team working under water, often taking turns, which will have to take individual decisions.
- Rapid to implement. There is a limit to the time that can be spent under water.
- Straightforward to implement. Working under water is hard enough without the addition of further complications.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I:

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

Information Sheet -9- Selecting Materials according to vehicle finish type, workplace methods and paint manufacturer

1.1. introduction

When customers look at a vehicle's paint job, they often see only a shiny, bright color. They seldom understand all of the technology involved in producing that long-lasting, tough, durable, high-gloss finish. There is much hidden technology under the surface of the paint. A professional technician comprehends all of the "chemistry" and skill needed to do a good repair. This chapter will introduce you to the materials needed to do competent paint and bodywork MATERIALS A vehicle body is protected by a complete finishing sys- tem. All parts of the system work together to protect the vehicle from ultraviolet radiation, weathering, pollutants, and corrosion. Materials are a general term referring to the products used to repaint a vehicle. Refinishing material chemistry has changed drastically in the past few years. New paints last longer but require more skill and safety measures for proper application The substrate is the metal, fiberglass, or plastic material used in the vehicle's construction. It will affect the selection of refinishing materials. The term paint generally refers to the visible topcoat. The most elementary painting system consists of primer.

PRIMECOATS AND TOPCOATS

A basic finish consists of several coats of two or more different materials. The most basic finish consists of

- Prime coats (primer-sealer, etc.)
- Topcoats (color coat or basecoat/clear coat)

The **primer** improves adhesion of the topcoat. It is often the first coat applied. Paint alone will not stick or adhere as well as a primer. If you apply a topcoat to bare substrate, the paint will peel, flake off, or look rough. This is why you must "sandwich" a primer between the substrate and the topcoat. Primer-sealers also prevent any chemicals from bleeding through and showing in the topcoats of paint. Basecoat/clear coat paint systems use a color coat applied over the primer with a second layer of clear coat over the color coat. This is the most common paint system used today. The clear

paint brings out the richness of the underlying color and also protects it. It makes the paint shine more than a single layer of color without a clear coat

Fig-20 paint or finish work

Water base paint, as implied, uses water to carry the pigment. It dries through evaporation of the water. Some manufacturers are starting to use water base paints on new vehicles. This helps satisfy stricter emission regulations in some geographic areas. The basecoat of color is water base. Then, an enamel topcoat is applied over the water base paint to protect it from the environment.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

1.

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

Information Sheet-10-Using and storing materials according to manufacturer

1.1. Housekeeping Signs

The workplace or office is a place where productivity is expected and having a pleasant work area certainly adds to a positive environment. Employees can do their part in addition to regular cleaning staff housekeeping and caretaker maintenance to keep it clean, safe, and healthy for all.

Collecting and storing material that can be reused

The proper care and storage of materials, tools and equipment's are not only the concern of the management but of the workers who use the equipment.

A major responsibility of the technician is to ensure that materials, tools and equipment are maintained in a good condition and are readily available when required for the various work activities. Faulty tools and equipment's are a common reason for delays on technical activities.

Good organization of stored materials is essential for overcoming material storage problems whether on a temporary or permanent basis. There will also be fewer strain injuries if the amount of handling is reduced, especially if less manual materials handling is required. The location of the stockpiles should not interfere with work but they should still be readily available when required. Stored materials should allow at least one meter (or about three feet) of clear space under sprinkler heads.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

Information Sheet -12- Completing polishing out causing damage to component or system

We recommend only polishing as needed, which is typically around one to two times per year during a full detail. After a thorough multiple step polishing process has been completed you can maintain the finish properly using the correct washing and drying products and techniques. Keeping the paint in good condition will ensure it needs less frequent polishing.

Use a Buffer

While you can polish by hand, it is highly recommended to use a quality buffer for maximum results. When you remove imperfections in your paint, you are working in polishing particles thoroughly and evenly. To do this by hand, you need to use a fair amount of pressure while moving the pad rather quickly. To put it in perspective, the standard in the industry for buffers is the Porter Cable. This buffer can generate 6,800 oscillations per minute at full speed very safely and effectively.

Imagine trying to move your arm 6,800 times per minute for hours on end, all while exerting 10 - 15 lbs of pressure on the applicator pad. It's impossible to duplicate by hand and it can be tiresome to do a small fraction of this work by hand.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

LAP TEST	Performance Test

Name…… ID……Date……

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **3** hour. The project is expected from each student to do it.

Task 1: performing Test card preparation to enable a visual comparison between matched and original paints

Task 2. Performing Matched and original paint comparisons

LG #25	LO #4- Denib work

Instruction sheet

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

- Identifying surface materials and finish requirements.
- Identifying Hazards
- Installing and set-up Denibbing heads according to enterprise procedures
- Finishing Job surface to enterprise requirements.
- Completing All denibbing procedures within recognised enterprise guidelines.
- Denibbing Work without causing damage to any component or system.
- Carrying out all activities according to industry regulations/guidelines, WHS legislation, and enterprise procedures/policies.

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

- Identify surface materials and finish requirements.
- Identify Hazards
- Install and set-up Denibbing heads according to enterprise procedures
- Finish Job surface to enterprise requirements.
- Complet All denibbing procedures within recognised enterprise guidelines.
- Denib Work without causing damage to any component or system.
- Carry out all activities according to industry regulations/guidelines, WHS legislation, and enterprise procedures/policies

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet 1-Identifying surface materials and finish requirements

1.2. Introduction

Denibbing is the removal of “nibs” and imperfections from your finish, and it should be performed between each coat of any finish applied.

WHAT IS DENIBBING

Denibbing is the process of gently sanding between coats of finish with a high grit abrasive paper to smooth over any imperfections in the finish such as:

- rush marks if you’re applying finish with a brush
- raised grain which is when the fibers of the wood swell slightly as a reaction to moisture from the finish soaking in to the wood and
- any airborne dust, debris or hairs that might have settled on the finish while it was curing

what finishes to denib (and which you shouldn't)

• You can denib any of the following finishes: Paint, varnish, lacquer, stain, dye, polyurethane, shellac and any type of oil finish.

• You shouldn’t denib a wax finish, as wax tends to fill the grain of the grain of the wood making it smooth

WHAT TO USE

- You can use a high grit abrasive paper like 240, 320, 400, 500, 600 grit – it doesn’t really matter - any of those will do the job – if you use a lower grit like 240 you’ll do a little bit less work but your finish will be less smooth, if you use a higher 600 grit you’ll do a little more work but have smoother finish. Personally I like to use 400 grit, but to be honest there’s really not much in it so in my opinion it's not worth worrying about, but I wouldn't go lower than 240 grit or higher than 600.
- An alternative is 0000 steel wool – that might work better in situations where you’re denibbing something that’s curved for example, and some people prefer it

over abrasive paper, but personally I prefer wet and dry paper mainly because it's cheaper

Self-Check – 1	*Written test*

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

1.

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

Information Sheet 2- Identifying Hazards

2.1. HAZARDOUS MATERIAL SAFETY

Work intelligently around hazardous materials! Be in-formed; read the warnings on the product labels and in manufacturers' literature. If more information is desired, get copies of the material safety data sheets (MSDS) for specific products from the shop's office or from the mate- rial suppliers. Water* 1 Foam* Multipurpose dry chemical Foam* Carbon dioxide 5 Halogenated agent Standard dry chemical Purple K dry chemical

- **Material safety data sheets (MSDS)** contain information on hazardous ingredients and protective measures that the technician should use. MSDS, available from al product manufacturers, detail chemical composition and precautionary information for all products that can present a health or safety hazard. An example of an MSDS is shown in Figure.
- **Hazardous waste**, as determined by the Environmental Protection Agency (EPA), is a solid or liquid that can harm people and the environment. If the waste is on the EPA list of known harmful materials or has one or more of the following characteristics, it is considered hazardous.
- **Ignitability** means the material or waste fails the ignitability test if it is a liquid with a flash point below 140°F or a solid that can spontaneously ignite.
- **Corrosiveness** means a material or waste is considered corrosive if it dissolves metals and other materials or burns the skin. It is an aqueous solution with a pH of 2 and below, or 12.5 and above. Acids have the lower value and alkalis have the higher value.

WARNINGS AND REGULATIONS

Right-to-Know Laws specify essential information and stipulations for safely working with hazardous materials. They started with OSHA's Hazard Communication Standard. This document was originally intended for chemical companies and manufacturers that require employees to handle potentially hazardous materials in the workshop.

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. write the requirements of WHS.
2. Hazards generally arise from the following aspects of work and their interaction. What are they?
3. How to identify Potential hazards?
4. What are the information that includes in safety data sheets (SDS)?
5. What is the difference between risk assessment and risk management?

Information Sheet 1- Completing All denibbing procedures within recognised enterprise guidelines.

4.1. Redefine your finish time and reclaim lost productivity

It's time to revolutionize your paint shop productivity with the Perfect-it Denib System. Unlike anything else available in the industry, it's designed to remove dirt nibs faster and easier, resulting in a better finish!

• Reduce paint finishing areas down to less than the size of a Euro.

• Pinpoint micro-sanding saves time by allowing you to sand dirt nibs away while minimizing flat spots.

Improve final finishes. Unlike traditional paint finishing tools and techniques,

The Perfect-it Denib System minimizes the chance of sanding texture flat when removing dirt defects, allowing you to match the OEM finish and texture for truly outstanding results. Streamline technician training. The Perfect-it Denib System is incredibly easy to use.

Technicians catch on quickly, which makes this product a natural for new hires and seasoned professionals alike. Technicians appreciate the lightweight tools and timesaving features that make each paint finishing job easier to complete.

4.2. Using the Perfect-it Denib System

- ✓ Select either the 1000 or 1500 grit sanding disc and attach to the sanding tool.
- ✓ Depending on the abrasive selected, lightly sand away nib or refine sand scratches. Wipe area clean. Attach foam pad to the dual-action polishing tool and add purple polish to the pad and the sanded area.
- ✓ Buff the surface and wipe the area clean. (Dark-colored cars may require an extra swirl-elimination step with Ultrafine SE polish)

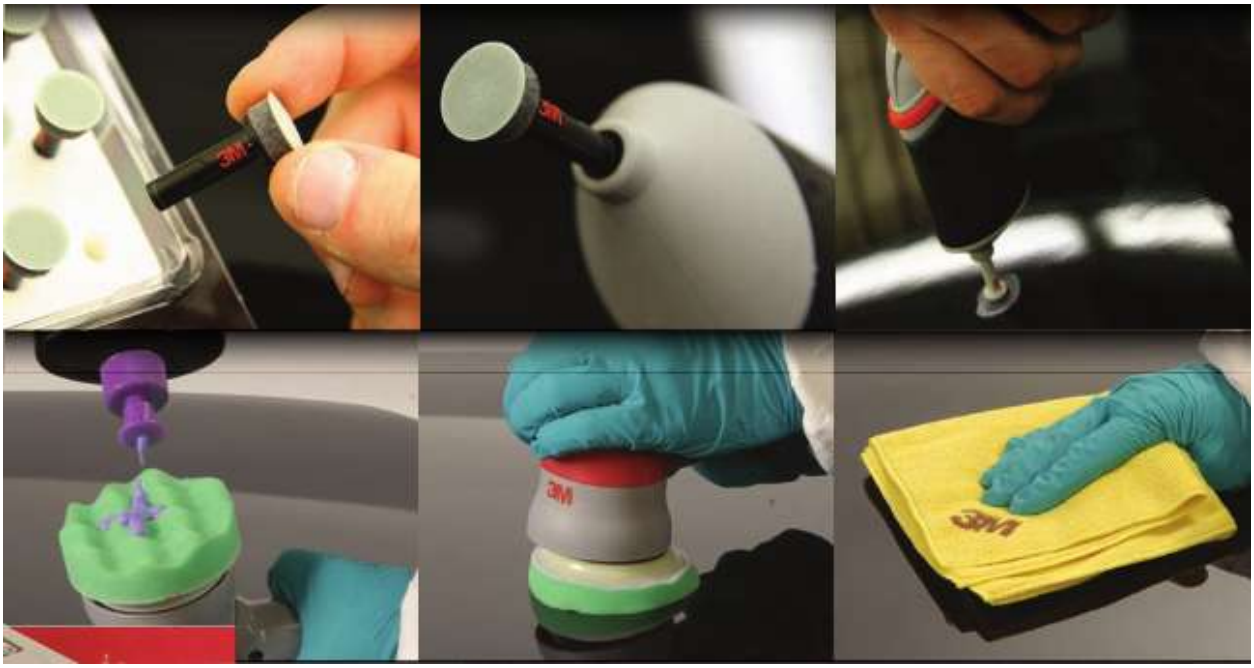

Fig-20

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

1.

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

Information Sheet 1-Completing All denibbing procedures within recognised enterprise guidelines

WHY DO IT?

- Starting with the obvious reason and that is to get your finish as smooth and professional looking and feeling as possible. It really does make a huge and very noticeable difference. It might seem counter-intuitive to be sanding a finish that you've just applied, so I prefer to think about it as polishing the finish that you've applied rather than sanding it.
- It's really easy to do, it isn't time consuming at all, and it's also inexpensive. I tend to use is 400 grit wet and dry paper.

HOW TO DO IT

• Once you're at a point with your project when you are ready to apply finish after sanding your project to your chosen grit – whether that is 120, 240 or whatever it might be, and it's nice and smooth to the touch, you're ready to apply your chosen finish, whether it's paint, varnish, oil, shellac - whatever. Apply the first coat of finish, and wait for it to fully dry based on the manufacturers instructions. You need it to be totally dry, not just dry to the touch.

- If you've used a finish that seals the wood like varnish, lacquer, shellac or polyurethane for example, I'd recommend spraying on a bit of water both to the project and to the abrasive paper and wet sanding – this forms a slurry on the surface and helps keep things smooth and removes any particles a little easier. You don't have to that though, you can use it dry if you prefer. If you've chosen to use steel wool though, then you'll want to use that dry, otherwise your steel wool will turn rusty!
- If your finish is paint, stain, dye or oil then you're better off avoiding using water and sanding it dry
- You don't need to apply much pressure at all while you're sanding - just go over it very gently, and do it in the direction of the wood grain, unless it's MDF or something that doesn't have a wood grain ofcourse. Doing it in the direction of

the grain helps to hide any markings from sanding. You don't need to go over the same area any more than once or twice, it should feel smooth after one or two light passes. Check with your hand to see if it feels smooth, and when it feels good, you've done enough.

- If you wet sanded, wipe away any dust with a cloth. If you dry sanded, you might want to blow or brush it away instead
- You might notice at this point that the finish looks really bad, I might look dull, dusty or kind of murky, but don't worry about that, because the next coat of finish is going to make it look beautiful again!
- Now you can apply your next coat of finish in the same way as you did before, wait for it to full dry again. If you're happy with the finish and it's nice and smooth then you are all done! But if you want to apply more coats of finish, repeat the process of sanding or wet sanding once again, and then wiping, blowing or brushing off the dust again and applying another coat.
- You can do that as many times as you need to until you're happy with the finish.
- Once your final coat of finish dries, it should be nice and smooth to the touch

Information Sheet 1- Carrying out all activities according to industry regulations/guidelines, WHS legislation, and enterprise procedures/policies.

INTRODUCTION TO WHS

The WHS requires the provision of any information, training, instruction or supervision that is necessary to protect all persons from risks to their health and safety arising from work carried out as part of the conduct of the business or undertaking.

The WHS must ensure that information, training or instruction provided to a worker is suitable and adequate having regard to:

- the nature of the work carried out by the worker
- the nature of the risks associated with the work at the time of the information, training and instruction, and
- the control measures implemented.

The risk management process

A risk assessment is not mandatory for spray painting and powder coating under the WHS Regulation. However, in many circumstances it will be the best way to determine the measures that should be implemented to control risks. It will help to:

- identify which workers are at risk of exposure
- determine what sources and processes are causing that risk
- identify if and what kind of control measures should be implemented, and
- check the effectiveness of existing control measures.

Risk management is a systematic process to eliminate or minimise the potential for harm to people.

Identifying the hazards

The first step in the risk management process is to identify all hazards associated with spray painting and powder coating. This involves finding things and situations which could potentially cause harm to people.

Hazards generally arise from the following aspects of work and their interaction:

- physical work environment
- equipment, materials and substances used

work tasks and how they are performed, and work design and management

Hazards may be identified by looking at the workplace and how work is carried out. It is also useful to talk to workers, manufacturers, suppliers and health and safety specialists and review relevant information, records and incident reports.

Potential hazards may also be identified through:

- inspecting the materials and equipment that will be used during the spray painting or powder coating process, and
- reading product labels, SDS and manufacturers' instruction manuals.
- Identifying the hazards of spray painting and powder coating chemicals

The health effects that a worker may experience following exposure to hazardous chemicals can become apparent after a short period of time and include headaches, nausea or vomiting, dizziness burns to the skin or eyes and irritation to the nose, throat and lungs. Serious long-term health effects caused by exposure to hazardous chemicals with symptoms that may not be immediately apparent can also occur. Long-term health effects include asthma, dermatitis, kidney or liver damage, cancer and damage to the reproductive system and central nervous system.

Many chemicals used in spray painting and powder coating also have physicochemical hazards. For example, many organic solvents are flammable and some chemicals used for cleaning or surface preparation may be corrosive. Information about the hazards of chemicals is available from labels and safety data sheets (SDS).

A SDS includes information on the health effects, physicochemical properties, safe handling and storage, emergency procedures, and disposal considerations. It also contains information about how hazardous chemicals can enter the body, for example by inhalation into the lungs, absorption through the skin and eyes and through swallowing, including accidently ingesting small amounts. If you don't have a SDS for a hazardous chemical supplied to your workplace, you must get one from the manufacturer, importer or supplier of the chemical. You should also consider getting a current SDS before you decide to purchase a new chemical as it is useful to identify hazards before you introduce them into your workplace.

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

6. write the requirements of WHS.
7. Hazards generally arise from the following aspects of work and their interaction. What are they?
8. How to identify Potential hazards?
9. What are the information that includes in safety data sheets (SDS)?
10. What is the difference between risk assessment and risk management?

LG #26	LO #5- Buff work

Instruction sheet

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

- Identifying the requirements of surface materials and finish
- Identifying Hazards
- Installing and set-up Buffing heads according to enterprise procedures.
- Finishing Job surface with in enterprise requirements.
- Finishing procedures are completed
- Buffing works without causing damage to any system component.
- Carrying out all activities according to industry regulations/guidelines, WHS legislation, and enterprise procedures/policies.

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

- Identifying the requirements of surface materials and finish
- Identifying Hazards
- Installing and set-up Buffing heads according to enterprise procedures.
- Finishing Job surface with in enterprise requirements.
- Finishing procedures are completed
- Buffing works without causing damage to any system component.
- Carrying out all activities according to industry regulations/guidelines, WHS legislation, and enterprise procedures/policies.

Learning Instructions:

Information Sheet 1- Identifying the requirements of surface materials and finish

1.1. Final sanding

Final sanding involves using fine and very fine grits of material to prepare body surfaces for painting. Final sanding is one of the most important steps in surface preparation.
In fact, this operation is a standard part of most surface preparation procedures

Fig-21- sanding

The entire surface to be refinished must be scuff sanded to improve adhesion of the new paint. A clean, scuffed surface is very important for proper bonding of the new topcoat. Look at. Because coated abrasives (sandpaper) perform the actual cutting and leveling in the sanding operation, selecting the correct abrasive is critical to the quality of the finished work.

Use the right grit

REMEMBER when sanding during surface preparation, always use the correct grit or sandpaper coarseness. The lower the number on the back of the sandpaper, the coarser the grit. Very coarse grit includes #16 to #24 grinding discs and sanding discs. Very coarse grit is used for rapid removal of paint down to bare metal. Very coarse grit

SURFACE SANDING METHODS

Refinishing sanding can be done by hand or by using power equipment. Most heavy sanding, such as removing the old finish, is done with power sanders, but some conditions, particularly the delicate operations, dictate hand sanding. To operate an air sander, set the air pressure at the equipment manufacturer's specifications (typically about 70 psi, or 476 kPa). If you are right-handed, hold the handle of the sander in your right hand while using your left hand to apply light pressure and guide the tool.

Table 25–3 shows which type of sander should be used for various areas and operations. To protect chrome and emblems from damage, do not sand too close to trim and moldings. Mask nearby trim, decals, glass, handles, and emblems to prevent metal sparks from pitting these surfaces. In fact, it is a good idea to double-tape all moldings and trim on the panel before sanding. When using any mechanical sander, particularly a disc grinder, keep it moving so that no deep scratches, gouges, or burn through develop. Except when sanding bare metal, do not power sand styling lines as this will quickly distort the styling edge. When power sanding, replace the sandpaper as soon as paint begins to cake or "ball up." This paint buildup can scratch the surface and reduce the sanding action of the disc. Slowing down the speed of the sander helps prevent paint buildup on the sanding disc and prolongs sandpaper life. Generally, six to eight sanding discs or pads are required to featheredge the chips and scratches on the Average automobile. A foam backing pad should be used when power sanding crowned surfaces or when final sanding. With a Velcro sandpaper attachment, the foam backing pad fits.

Dry Sanding

This is basically the back-and-forth procedure just de- scribed. One of the problems with dry sanding is that the paper tends to clog with paint or metal dust. Tapping the paper from time to time or spinning it against a scuff pad will remove some of the dust.

Wet Sanding

Wet sanding solves the problem of paper clogging when fine sanding. It is basically the same action as dry sanding except that water, a sponge, and a squeegee are used in addition to the sanding block. Sandpapers are available in dry, wet, or wet-or-dry

abrasive types. When wet sanding, dip the paper in the water or wet the surface with the sponge. Use plenty of water to flush away old paint and sanding grit

Fig-22- Wet Sanding

Use long, smooth strokes and light pressure when wet sanding large areas A sanding block is needed to keep the surface level and to keep your fingertips from digging troughs in the surface. If wet sanding a small area, use a circular motion only on the specific problem area. Small dirt nibs or pieces of dust in the primer can often be removed with wet sanding in this manner. Never allow the surface to dry during the wet sanding operation. Also, do not allow paint residue to build up on the abrasive paper.

It is possible to tell how well the paper is cutting by the amount of drag felt as it moves across the surface being sanded. When the paper begins to slide over the surface too quickly and easily, it is no longer cutting. The grit has become filled with paint particles, or sludge. Rinse the paper in water to remove the paint, and sponge the surface to remove the remaining particles. Then the sandpaper will again cut the surface.

SURFACE SCUFFING

Surface scuffing involves using a very fine or ultrafine abrasive (paste material, sandpaper, or a scuff pad) to cut microscopic scratches in the body surface to be painted. This finely scratches the surface to aid proper paint adhesion. For example, if you paint over a fully cured, glossy paint without fine sanding or scuffing it, the new Paint will probably peel and flake off.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

1.

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

Information Sheet 2- Identifying Hazards

2.1. Identifying hazards

The first step in managing risks associated with spray painting or powder coating activities is to identify all the hazards that have the potential to cause harm.

Potential hazards may be identified in a number of different ways including:

- Conducting a walk through assessment of the workplace observing the work and talking to workers about how work is carried out
- inspecting the materials and equipment that will be used during the spray painting or powder coating process
- reading product labels, safety data sheets (SDS) and manufacturer's instruction manuals
- talking to manufacturers, suppliers, industry associations and health and safety specialists
- Reviewing incident reports.

Identifying the hazards of the chemicals

The health effects that a worker may experience following exposure to hazardous chemicals can become apparent after a short period of time and include headaches, nausea or vomiting, dizziness burns to the skin or eyes and irritation to the nose, throat and lungs. Serious long term health effects where the symptoms may not be immediately apparent can also occur. Long term health effects include asthma, dermatitis, kidney or liver damage, cancer and damage to the reproductive system and central nervous system. Many chemicals used in spray painting or powder coating also have physicochemical hazards. For example, many organic solvents are flammable and some chemicals used for cleaning or surface preparation may be corrosive.

Information about the hazards of chemicals is available from product labels and safety data sheets. A SDS includes information on the health effects, physicochemical properties, safe handling and storage, emergency procedures, and disposal considerations. It also contains information about how hazardous chemicals can enter the body (e.g. by inhalation into the lungs, absorption through the skin and eyes and through swallowing including accidently ingesting small amounts).

If you don’t have a SDS for a hazardous chemical supplied to your workplace, you must obtain one from the manufacturer, importer or supplier of the chemical. You should also consider obtaining a current SDS before you decide to purchase a new chemical as it is useful to identify hazards before you potentially introduce them into your workplace.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

1.

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

Information Sheet 4- Finishing Job surface with in enterprise requirements

Finish Sand & Buff

A labor time formula is provided should it be necessary to perform this operation. This Procedure includes the removal of orange peel and any blemishes that affect paint texture in order to produce a smooth finish to the entire panel surface. This process is not limited to “nib sanding” or “finessing” which is the removal of isolated dirt/dust particles only. The performance of this operation is not included in the Mitchell refinish labor time. The finish sand and buff formula is intended to be calculated as a percentage of the base refinish hours excluding overlap and clear coat. It DOES NOT APPLY to edges, jambs and undersides. For blended panels, the formulas should be applied to the full panel refinish time. No deduction for refinish overlap should be taken. Finish sand and buff outside surface area(s): Allow .3 per refinish hour (30%) to finish sand and buff each surface area(s)

de-nib & Finesse

A labor time formula is provided should it be necessary to perform this operation. This procedure includes the removal of small isolated dust particles (nibs) and the application of a finishing glaze. The performance of this operation is not included in the Mitchell refinish labor time. The de-nib and finesse formula is intended to be calculated as a percentage of the base refinish hours excluding overlap and clear coat. It does not apply to edges, jambs and undersides. For blended panels, the formulas should be applied to the full panel refinish time. No deduction for refinish overlap should be taken. De-nib and finesse outside surface area(s): Allow .2 per refinish hour (20%) to de-nib and finesse each surface area(s).

Information Sheet 5- Finishing procedures are completed

2.1. Surface Preparation

Appropriate surface preparation to ensure optimal coating and minimize reworks. Excellent practice includes:

- Washing off dirt using detergent and water followed by a water rinse before using any pre-cleaners.
- Use of pre-cleaners that can be diluted with water, where possible. Waterborne products based on alcohol and detergents below the compliant limit of 200 g/l are available.
- Use of spray bottles for pre-cleaners to spray a mist of pre-cleaner on the surface which is then wiped with a cloth. This uses less solvent than soaking or pouring liquid solvent on cloths. Alternatively, use cans with plunger/piston pumps for pre-cleaners.
- Use of a rental service for cloths instead of disposing of them. This service provides clean cloths, collects used cloths, and launders them for reuse while recovering the solvents.
- Use of dispensing units for fillers that give out the exact amount required to reduce wastage.
- Removing parts from vehicles before coating where feasible – this will reduce masking requirements.

Paint Mixing

Accurate estimation of, and mixing of, the amount of coating needed. Excellent practice includes:

- Measuring the area to be painted accurately.
- Use of paint manufacturers' charts and specifications to mix the right quantity. Use of a colorimeter or spectrophotometer could be considered.

- Use of an electronic precision scales. Ensure this is calibrated on a periodic basis, mounted on a stable, levelled properly and kept clean. Enclosing the scales in a sealed plastic bag to prevent spillages from causing weighing inaccuracies.
- Use of an automated paint dispenser.
- Use of a computerized precision paint mixing system which allows paint use by individual sprayers to be logged, improves work scheduling, and assists with stock control.
- Use of software for calculating material requirements for each job based on the type of repair and the repair area. This makes it easier to mix small amounts and reduces wastage.
- Use of color matching software.
- Use of software for job colour scheduling to minimise frequency of gun cleaning.
- Use of a system of preparing small metal test blanks along with every job to aid future colour matching.
- Establishing a process of comparing estimated and actual paint used to refine estimation techniques.

Refinishing Operation

Excellent practice for each time spraying is carried out includes:

- Choosing spray gun nozzle size to match refinishing product; choosing air hose recommended by the spray gun manufacturer.
- Ensuring air passages in the gun are not clogged.
- Ensuring air pressure matches that recommended by the spray gun manufacturer, and air is not too hot (causes solvent to evaporate before reaching the surface).
- Setting up the spray gun correctly (lowest air pressure chosen that will still provide the required atomization; optimal fan width suitable for the specific job and fluid flow rate) with a test spray of the pattern before beginning work.
- Ensuring booth air flow and temperature are at the required levels.

- Operating the spray gun correctly (gun to work piece distance, spray gun held perpendicular to the surface, constant speed, timing of start and end triggering, spray pattern, overlap previous stroke by 50%, visual feedback, edge painting techniques).
- Use of a laser guidance device on the spray gun to ensure optimal distance is maintained could be considered. This uses two laser beams that form a single dot when the spray gun is at the optimum distance. Too close, too far, or angled, the beams separate into two dots. Allows for high efficiency spraying and accurate 50% overlap.

Drying

Infrared drying lamps can be used for curing small painted areas, reducing energy costs by avoiding heating the entire booth and freeing up the spray booth at the same time.

Spray Gun Cleaning

Excellent practice for spray gun cleaning includes:

- Cleaning equipment immediately before paint hardens.
- Storing left over primer and basecoat for reuse.
- Pouring excess paint into a separate container before cleaning the spray gun. Such waste paint should be disposed of appropriately for recovery or disposal.
- Use of a spatula to scrape out paint residue from the gun cup before cleaning to reduce contamination of the gun-wash.
- Pre-cleaning the gun-cup before putting it into the gun cleaner to prolong gun-wash life.
- Use of gun washes with lower VOC content.
- Use of gun cleaning equipment which:

Self-Check – 1	Written test

Name…… ID……. Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

1.

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

Information Sheet 7- Carrying out all activities according to industry regulations/guidelines

1.1. introductions

Danish Waste management regulation is characterized by a combination of traditional regulation through laws and executive orders, and a wide range of other instruments such as taxes, fees, subsidy schemes, and agreements. Waste management is regulated in the environmental protection law (consolidation Act no 879, 26th June 2010) and the related executive orders and hereunder especially the executive order on waste (executive order no 1309, 20th December 2012). Since 1st January 1997, Denmark has banned the landfilling of waste suitable for incineration. As a consequence, flexible PVC is being landfilled as it is harmful in the incineration process and no current methods are available for recycling in Denmark. As the only exception from the general rule in the EU, Denmark has no packaging producer responsibility scheme for plastic packaging (except the deposit system for beer and soft drink containers, which is detailed in the next subsection). According to the environmental protection law, the responsibility for collecting and assigning all waste is allocated to the municipalities. The legal requirement is that the municipality shall establish arrangements that secure an environmentally sound waste handling. This entail that the municipalities by default has the responsibility for waste management. However, the responsibility for source sorted waste from businesses, suitable for recycling or recovery rests with the businesses, but under the authority and supervision of the municipalities.

Centers collect all types of waste except residual waste and a typical layout is depicted in Figure 1. Currently, there is no comprehensive information on how collected plastics are being treated after collection, but the main route is to export the collected plastic waste to sorting facilities in Sweden, Germany and the Netherlands.

Figure 1. Typical layout of a waste collection center. In the plastic collection area, bottles, bulky plastic waste such as garden furniture, rigid and flexible PVC, and plastic foils are received.

Plastic waste is presently becoming a focus point nationally and in the municipal collection schemes, leading to a general trend of increased source sorting and collection of plastic waste.

Based on a review of the municipal waste directives it is assessed that in 2013, 22 out of the 98 municipalities have established kerbside collection of rigid plastic waste, and in the majority of these, the collection is limited to detached houses. The rigid plastic waste collection schemes in 2013 cover some variations including:

- Collection frequency varies between one and two weeks.
- In few municipalities plastic waste is also collected from apartment buildings (among these Copenhagen, Frederiksberg, and Glad Saxe).
- The plastic waste collected is mainly plastic packaging, but some municipalities collect also other types of rigid consumer plastic waste.
- Some municipalities have voluntary purchase of sorting bins (reducing the more expensive residual fraction).

Flexible plastic waste is collected with the residual waste, but can also be delivered at some municipal collection stations. Flexible PVC is, as the only plastic waste fraction, sent to landfill. The frequency of municipalities with separate collection is likely to increase as several municipalities currently are running pilot tests with household source sorting and collection. One example of these developing arrangements can be found in Aalborg, where the fractions received are:

- Drinking bottles.
- Containers used for shampoo and conditioner.
- Containers used for washing and cleansing agents.
- Plastic bins, tubs, pots, jars, small buckets, and flowerpots.
- Plastic trays used for meat and vegetables.
- Various plastic foils and plastic bags, although not bread bags or plastic that has been in direct contact with food.
- Toys and other plastic articles from households.

The resource plan for waste management (2013–2018), sets up a framework for the municipalities within which the municipalities are in the process of developing

appropriated source sorting of household waste, and the frequency of multi-compartment waste bins is increasing.

Plastic bulky waste

Plastic bulky waste is covered by the waste executive order, and is collected at the manned waste collection centers. Bulky waste originating from households is under the responsibility of the municipalities, i.e. all municipalities collect this fraction at the recycling sites. Bulky waste originating from businesses is the responsibility of the companies. The sorted plastic bulky waste is collected and compressed into bales, and send to sorting facilities, mainly in northern Germany and Sweden, though a few facilities does exist in Denmark.

LG #27	LO #6- Identify paint faults, causes and rectification procedures

Instruction sheet

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

- Identifying Paint faults workplace procedures.
- Determining painting fault causes according to industry and workplace procedures.
- Determining Rectification procedures according to fault, type of finish material and industry standard practices and workplace requirements.
- Carrying out Identification and determination activities according to industry regulations/guidelines, WHS legislation, and enterprise procedures/policies.

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

- Identify Paint faults workplace procedures.
- Deter painting fault causes according to industry and workplace procedures.
- Determine Rectification procedures according to fault, type of finish material and industry standard practices and workplace requirements.
- Carry out Identification and determination activities according to industry regulations/guidelines, WHS legislation, and enterprise procedures/policies.

Learning Instructions:

Information Sheet 1- Identifying Paint faults workplace procedures

1.1. introduction

Paint problems include a wide range of defects that can be found before or after painting. To maintain repair quality and satisfy customers, you must be able to analyze and correct finish problems efficiently. If all technicians in the shop do their jobs, there will seldom be a reason to fix costly, time-consuming paint problems. Ideally, every vehicle can be released to the customer after paint baking and a minor clean-up.

Regretfully, even the best, most professional collision repair businesses will encounter minor paint flaws that must be fixed. On rare occasions, shop and paint company personnel will have to solve major paint problems on existing and freshly painted surfaces. The technical information provided in previous chapters will help you avoid mistakes that result in paint problems and repainting. This chapter will continue your study of collision repair by teaching you about paint problem conditions, causes, prevention, and correction. The last section the chapter summarizes how to clean a vehicle before it is released to the customer.

REPAIRING PAINT PROBLEMS

Most refinishing problems can usually be repaired, but this reworking requires time and money. Smart technicians take the time to prevent paint problems before they occur.

Unfortunately, there are a variety of causes for defects in a vehicle's finish. They usually originate as a result of problems in the preparation of the body surface, painting procedure, environment, paint ingredients, and other sources

PROBLEMS IN WET PAINT

If you see paint defects while spraying, you must decide whether to stop work immediately or whether the problem can be fixed so you can continue painting. This depends on the type and extent of the paint problem.

PAINT FISH-EYES

Paint fish-eyes are small, BB-sized dimples or craters that form in the liquid paint film right after spraying. If watched closely when forming, the paint will actually flow up and out of the small dimple or crater. Contaminants mixed with the paint are pushing the paint out of the area.

Self-Check – 1	Written test

Name…… ID……. Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

1. ------- is an art, and only an experienced auto body shop can accurately match new paint to an original finish. (2)

A. paint matching B. paint identification C. paint mixing D. paint replacing

2. When your car was painted at the factory (2)

A. the entire body is painted at the same time from the same batch of paint

B . the entire body is painted at the different time from the same batch of paint

C. the entire body is painted at the different time from the different batch of paint

D. the entire body is painted at the same and different time from the different batch of paint

3. which of the following is true? (2)

A. Automotive paint is made of resin, pigment and solvent.
B. Solvent provides the right amount of viscosity
C. Pigment comes in powder form and includes colors or toners that are mixed together to give the finish
D. All

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

Information Sheet 1. Determining painting fault causes according to industry and workplace procedures.

Paint fault	Possible Causes
Acid Rain	- Rain containing airborne contaminants from manufacturing processes, chemical industries, and power stations. - Contaminants may become acidic or alkaline when combined with water (sulfur dioxide - acidic, cement dust - alkaline)
Industrial Fallout	- Iron and steel particles from heavy industry, foundries, railroads
Water Spotting	- Droplets of water on paint which is not sufficiently cured due to: - Excessive film thickness, drying time too short - Failure of cross linking due to moisture contamination - Unsuitable thinner
Scratches	- Frequent use of brush or soft cloth automated car wash facilities - Wiping a dry surface instead of rinsing with water
Environmental Contamination	- Bird droppings, acid rain, other environmental influences
Polishing Marks	- Top coat not through-dried - Sandpaper too coarse - Unsuitable polish - Polishing through layers on edges
Stonechip	- High use of gravel roads - Frequent highway use - Following vehicles too close - Improper film build
Corrosion	- Paint removed by chipping or scratching exposing bare

	metal - Inadequate pre-treatment of metal - Rust not removed before application of coatings - Metal surface contaminated before application of coatings
Orange Peel / Texture	- Incorrect spray pressure, gun setup, viscosity, technique, or application temperature - Wrong combination of solvents or non-system solvents - Substrate not sanded thoroughly
Dirt Inclusions	- Various types of contamination typically introduced during the application or drying process
Adhesion Problems with Plastics	- Insufficient cleaning, drying (tempering) 0 Incorrect primer has been used
Adhesion Problems – Clearcoat	- Excessive coat thickness of basecoat - Intermediate and final flash-off times of the basecoat too short - Wrong mixing ratio for clearcoat and hardener
Clouding / Mottling	- Incorrect spray viscosity, technique, flash off times, spray temperature - Defective spray gun setup, incorrect spray pressure - Unsuitable thinners
Contamination (Fish-eyes / Silicone)	- Oil, wax, grease or silicone contamination - Contaminated air supply - Use of polishes or aerosol sprays containing silicone (e.g. interior cleaners or dressings) - Insufficient cleaning
Peeling Problems	- Substrate not sufficiently prepared (rust, grease, moisture, poor sanding or cleaning) - Use of incompatible material or an incompatible substrate - Flash off and drying times too short

	- Condensation of substrate due to temperature changes
Sanding Marks – Topcoats	- Sanding paper too coarse - Soft, solvent reversible substrates e.g. acrylic lacquer (T.P.A.) - Insufficient film build
Sanding Marks - Substrate Preparation	- Insufficiently sanded polyester stopper - Insufficient isolation of the polyester before topcoat application
Loss of Gloss / Matting	- Film thickness/ air humidity - Solvent-sensitive substrate - Incorrect mixing or contaminated hardener, or unsuitable thinner - Insufficient airflow in oven or interrupted baking
Hiding Power (Coverage, Opacity)	- Substrate not uniform (effect finishes) - Color coat film build too low
Color Off-shade	- Weathered surface - Incorrect spraying technique
Clearcoat Yellowing	- Wrong or contaminated hardener - Insufficient clearcoat film thickness
Moisture Blisters	- Residue of sanding water in corners, edges, crevices, or below decorative strips - Contaminated air supply - Insufficient isolation of polyesters - Ambient humidity too high
Adhesion Problems – Polyester	- Substrate not carefully prepared - Polyester material unsuitable for galvanized substrate
Edge Mapping Due to Solvent Penetration	- Insufficient isolation where topcoat was sanded through to substrate - Isolated with unsuitable filler - Filler incorrectly applied - Insufficient drying of substrate

Wrinkling, Rippling, Lifting	- Finish not fully cured (synthetic resin finishes) - Unsuitable substrate (aerosol paints, acrylic lacquer or nitrocellulose) - Excessive film build
Shrinkage / Edge Mapping	- Substrate not fully cured - Subsequent coats applied too soon to preparatory materials - Excessive film thickness - Sanding paper too coarse
Striping / Banding	- Spray technique or PSI, material viscosity, or spray gun setup - Flash off time too short - Unsuitable thinner for application conditions
Pinholes	- Fiberglass bodies - Insufficient mixing of polyesters
Pinholes - Substrate Preparation	- Substrate insufficiently dried - Polyester material not sufficiently isolated - Pores not deeply sanded
Solvent Pop	- Solvent or air trapped in film escapes during drying leaving pop marks - Caused by incorrect spray viscosity, spray pressure, flash off time, or improper drying - Incorrect choice of hardeners and thinners
Runs	- Incorrect spray viscosity, flash off time, technique, or film thickness - Defective spray gun, incorrect gun setup, or spray pressure - Temperature of paint, substrate or room too low - Incorrect choice of hardener and/or thinner
Peroxide Staining from Hardener in	- Incorrect addition of hardener - Insufficient mixing

Polyester Body Filler	

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

4. ------- is an art, and only an experienced auto body shop can accurately match new paint to an original finish. (2)

A. paint matching B. paint identification C. paint mixing D. paint replacing

5. When your car was painted at the factory (2)

A. the entire body is painted at the same time from the same batch of paint

B . the entire body is painted at the different time from the same batch of paint

C. the entire body is painted at the different time from the different batch of paint

D. the entire body is painted at the same and different time from the different batch of paint

6. which of the following is true? (2)

E. Automotive paint is made of resin, pigment and solvent.
F. Solvent provides the right amount of viscosity
G. Pigment comes in powder form and includes colors or toners that are mixed together to give the finish
H. All

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

Information Sheet 1. Determining Rectification procedures according to fault, type of finish material

Ventilation systems

Two common types of ventilation used in spray painting are:

- Local exhaust ventilation captures the overspray and solvent vapour as close to the source of release as possible by drawing the contaminants into a capture hood. They should be fitted with a particulate filtration system to filter overspray. Wherever possible, local exhaust ventilation should be used when a spray booth cannot be used. It may be necessary to use it in combination with other control measures.
- Dilution ventilation dilutes and displaces contaminated air with fresh air which is supplied to the work area by mechanical supply fans or natural air currents through doors, windows or other openings in the building. It can be used to supplement local exhaust ventilation.

When using dilution ventilation:

- The spray painting operator should stay between the air supply inlet and the source of vapours or aerosols generated
- Temporary barriers may be needed to channel the dilution ventilation through the spray zone and to restrict cross currents
- make sure the contaminated exhaust air does not re-enter the work area
- Use auxiliary mixing fans to disperse the spray painting emissions towards the outlet and to enhance the rate of air dilution.

Baking ovens

Why Switch to Oven-Baked Car Repainting?

The value of your car significantly depreciates over time. This is even more so if its paint has already lost its natural shine and gloss. And while respraying your car can be a do-it-yourself project, the quality of the workmanship may not be that great.

Oven-Baked Automotive Painting

You don't have to paint your car yourself. Nova Smash Repairs says you can always take it to a car body shop for a fresh coat of paint. However, you need to choose between ordinary spray painting and oven-baked car painting. While one is definitely cheaper than the other, oven-baked car painting does have its perks.

Dust-Free Environment

The environment where low temperature oven-baked car painting is performed is generally dust-free. This results in a more stable application of a coat of paint. It's this dust-free environment that makes the car oven an ideal place for automotive repainting. If it were to be performed outside, dust would readily settle on the wet paint, giving the whole car a speckled look and a rather course finish, instead of the glossy and smooth finish you'd expect.

Environment-Friendly

Additionally, the room-sized oven is fully filtered to protect the environment from the harmful chemicals found in automotive paints. If the painting job were to be performed outside, the airborne chemicals can be carried elsewhere and can readily settle on other life forms in the immediate surroundings.

More Durable Finish

Perhaps the best advantage of oven-baked car painting over the ordinary type of automotive repaint is the strength and durability of the finished paint coat. With air temperature maintained at a constant setting, individual paint molecules are evenly distributed across the surface of the car. This creates a very even layer and colour of automotive paint. Additionally, since the paint molecules have been sprayed onto the car in exactly the same environmental conditions, they are better able to bond with each other. This creates a stronger and more durable paint finish.

Oven bake technology

Have extraction systems and filters, which remove atomized spray from the air. This creates a clean, dust- free environment with reduced overspray. The extraction system also creates a seal around the doors of the paint booth so that dust and other particles that might be found in a typical traditional workshop cannot enter the spraying area while work is in progress. If a job is sprayed in traditional workshop conditions, dust can contaminate the paint and ruin the integrity of your work.

Oven bake technology

Create an ambient spraying temperature of approximately 64 to 70 degrees Fahrenheit. In a traditional workshop, the spraying temperature is dependent on the local climate or heating systems and this makes it more difficult to maintain optimum spraying temperatures. Professional paints are sprayed at paint booth temperatures so that a wet, even application of color can be achieved. If a job is painted in a traditional

workshop in conditions that are too warm, dry patches in the paint occur. If the temperature is too cold, paint will not cure quickly enough and this causes it to run or sag.

Modern paint materials

use hardeners and reducers that are designed to dry at low-bake temperatures of 160 to 175 degrees Fahrenheit. Most paints dry within 30 minutes if they are exposed to the baking temperatures inside a paint booth. When a vehicle is painted and left to dry in normal traditional workshop conditions, solvents remain inactive underneath the final coat of color and this slows down the drying process. If paint isn't fully dry when a job is unmasked or polished, tearing occurs and this results in the vehicle having to be prepared and painted a second time.

Health and Environmental Issues

The extraction system in Oven booths reduces the amount of volatile organic compounds that are released into the atmosphere. Once a coat of paint has been applied, operatives can usually return to the paint booth without respiratory equipment within three minutes. In a traditional workshop environment, it can often take hours for overspray to clear. This increases the risk of breathing in harmful polyisocyanate materials for other workers and increases the level of VOC emissions (Volatile organic compound). This presents a significant risk to the surrounding environment and violates current health and safety legislation.

Heating and lighting systems

Identifying and checking safety equipment If personal protective equipment (PPE) is to be used at the workplace, the person conducting the business or undertaking must ensure that the equipment is selected to minimize risk to health and safety including by ensuring that the equipment is: suitable for the nature of the work and any hazard associated with the work „ a suitable size and fit and reasonably comfortable for the person wearing it maintained, repaired or replaced so it continues to minimize the risk, and „ used or worn by the worker, so far as is reasonably practicable.

A person conducting a business or undertaking who directs the carrying out of work must provide the worker with information, training and instruction in the proper use and wearing of personal protective equipment; and the storage and maintenance of personal protective equipment.

A worker must, so far as reasonably able, wear the PPE in accordance with any information, training or reasonable instruction and must not intentionally misuse or damage the equipment.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

1.

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1. ---------- 2. ---------- 3. ----------

Information Sheet 4- Carrying out Identification and determination activities

Introduction

Danish Waste management regulation is characterized by a combination of traditional regulation through laws and executive orders, and a wide range of other instruments such as taxes, fees, subsidy schemes, and agreements. Waste management is regulated in the environmental protection law and the related executive orders and hereunder especially the executive order on waste (executive order no 1309, 20th December 2012). Since 1st January 1997, Denmark has banned the landfilling of waste suitable for incineration. As a consequence, flexible PVC is being landfilled as it is harmful in the incineration process and no current methods are available for recycling in Denmark. As the only exception from the general rule in the EU, Denmark has no packaging producer responsibility scheme for plastic packaging (except the deposit system for beer and soft drink containers, which is detailed in the next subsection). According to the environmental protection law, the responsibility for collecting and assigning all waste is allocated to the municipalities. The legal requirement is that the municipality shall establish arrangements that secure an environmentally sound waste handling. This entail that the municipalities by default has the responsibility for waste management. However, the responsibility for source sorted waste from businesses, suitable for recycling or recovery rests with the businesses, but under the authority and supervision of the municipalities.

Table 2. Key roles in collection and recycling of plastic packaging waste in Denmark

Key actor	Role
Importers and producers of plastic packaging	Put plastic packaging on the Danish market.
Municipalities	Responsible for collection of household waste. Responsible for establishment and operation of recycling centres that must be able to receive sorted waste from businesses.
Consumers of plastic packaging	Buy plastic packaging on the Danish market.
Waste transporters (Affaldstransportører) & Collection companies for sorted recyclable waste (Indsamlingsvirksomheder for kildesorteret genanvendeligt erhvervsaffald)	Transport the plastic packaging waste from businesses to recyclers, register volumes and report to the EPA (waste-database).
Recyclers	Recycling of plastic packaging waste into new products.
The Danish EPA	Collects data on the recycling of plastics and reports data to Eurostat according to the Packaging directive.

Besides the executive order on waste, a number of executive orders regulate specific waste fractions for which municipalities do not have responsibility. This includes for plastics the executive order on deposit and collection of beverage containers for beer and certain soft drinks, where the collection is done by Dansk Retursystem A/S in a producer responsibility scheme paid by producers and importers (Dansk Retursystem, 2013). The system implies that these products only can be marketed in recyclable or refillable packaging, and importers and producers pay for the collection and recycling. Beverage packaging is a special focus area in Denmark, as it represents a considerable volume. In 1978, a weight-based fee on new beverage packaging, creating a motivation increase of reuse and minimization of volume was introduced. In 1988 there was placed a levy on disposable tableware and in 1994 levies was placed on plastic shopping bags, both stimulating reuse. Weight-based fees were introduced on sales packaging and multipacks with volumes less than 20 litres, and in 2000 the fees were adjusted according to results from Life Cycle Assessment to reflect both weight and environmental impact. In Denmark, plastic bulky waste is collected at recycling centres. Collection and recycling of plastic waste

Plastic waste is presently becoming a focus point nationally and in the municipal collection schemes, leading to a general trend of increased source sorting and collection of plastic waste.

Based on a review of the municipal waste directives it is assessed that in 2013, 22 out of the 98 municipalities have established curbside collection of rigid plastic waste, and in the majority of these, the collection is limited to detached houses. The rigid plastic waste collection schemes in 2013 cover some variations including:

- Collection frequency varies between one and two weeks.
- In few municipalities plastic waste is also collected from apartment buildings (among these Copenhagen, Frederiksberg,
- The plastic waste collected is mainly plastic packaging, but some municipalities collect also other types of rigid consumer plastic waste.
- Some municipalities have voluntary purchase of sorting bins (reducing the more expensive residual fraction).

The frequency of municipalities with separate collection is likely to increase as several municipalities currently are running pilot tests with household source sorting and collection. One example of these developing arrangements can be found in Aalborg, where the fractions received are:

- Drinking bottles.
- Containers used for shampoo and conditioner.
- Containers used for washing and cleansing agents.
- Plastic bins, tubs, pots, jars, small buckets, and flowerpots.
- Plastic trays used for meat and vegetables.
- Various plastic foils and plastic bags, although not bread bags or plastic that has been in direct contact with food.
- Toys and other plastic articles from households.

The resource plan for waste management (2013–2018), sets up a framework for the municipalities within which the municipalities are in the process of developing appropriated source sorting of household waste, and the frequency of multi-compartment waste bins is increasing.

Plastic bulky waste

Plastic bulky waste is covered by the waste executive order, and is collected at the manned waste collection centres. Bulky waste originating from households is under the responsibility of the municipalities, i.e. all municipalities collect this fraction at the recycling sites. Bulky waste originating from businesses is the responsibility of the companies. The sorted plastic bulky waste is collected and compressed into bales, and send to sorting facilities, mainly in northern Germany and Sweden, though a few facilities does exist in Denmark.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

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

You can ask you teacher for the copy of the correct answers.

Answer sheet

Test I

Score = _____
Rating: _____

LG #28	LO #7- Identify paint faults, causes and rectification procedures

Instruction sheet

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

- Appling environmental refinishing materials conform to requirements for temperature, extraction of fumes and cleanliness.
- Appling refinishing materials at manufacturer/ component supplier recommended intervals using approved methods.
- Dried refinishing materials by using approved methods and equipment.
- Applying refinishing materials without causing damage to any system components
- Finishing and producing by meetings specification for colour, texture, depth and gloss and is contaminant-free.
- Completing surface refinishing within approved time frames.
- Carrying out application activities according to industry regulations/guidelines, WHS legislation, and enterprise procedures/policies.

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

- Apply environmental refinishing materials conform to requirements for temperature, extraction of fumes and cleanliness.
- Apply refinishing materials at manufacturer/ component supplier recommended intervals using approved methods.
- Dried refinishing materials by using approved methods and equipment.
- Apply refinishing materials without causing damage to any system components
- Finishes and producing by meetings specification for colour, texture, depth and gloss and is contaminant-free.
- Complete surface refinishing within approved time frames.
- Carry out application activities according to industry regulations/guidelines, WHS legislation, and enterprise procedures/policies.

Learning Instructions:

Information Sheet 1- Appling environmental refinishing materials conforms to requirements for temperature, extraction of fumes and cleanliness

How to Apply a Clear Base Coat to a Car

Much of a vehicle's appeal has nothing to do with its performance and is purely superficial. Although a car's speed and agility on the road is important, it means very little in terms of the total package if it is not also attractive in its shape and hue. If you decide to change its color or repair damage to the exterior after an accident, achieving maximum attractiveness through repainting can be quite costly in a body shop. Consequently, you may wish to consider doing the job yourself.

Although acrylic paints are the easiest to apply, they show signs of wear from UV rays and elements quite quickly. So, if you're going to invest the money in automotive paint and your time in applying it, it may be a better choice in the long run to go with a base coat, or clear coat paint job.

Part 1 of 3: Preparing your materials

Materials Needed

- Air compressor
- Automotive clear coat (optional)
- Automotive paint
- Buffer
- Buffing compound
- Catalyzed glazing putty (if needed)
- Clean cloth
- Denatured alcohol, or other painting prep solvent (optional)
- Electric/orbital sander (optional)
- Face mask
- Masking tape
- Moisture separator filter
- Paper (thick brown industrial paper)
- Paint gun
- Plastic or paper sheets, large
- Primer paint (if needed)
- Sandpaper (ranging from 360- to 3000-grit, depending on damage to original paint)
- Water

Step 1: Choose your vehicle's future color. Purchase the paint and other necessary materials for the job (listed above).

Step 2: Prepare your workspace. Ideally, it should be both well-ventilated and free of dust or debris. This is because the fumes given off by the preparatory and paint products are harmful if inhaled, and you don't want bits of grime making their way onto your wet paint. This means you should avoid outdoor spaces or garages without windows or doors you can open.

- While it is virtually impossible to achieve a completely dust-free environment in a do-it-yourself situation, just do your best to minimize the risk of debris marring your wet paint. A clean garage with a partially opened door or window is usually sufficient.
- **Tip**: Before beginning the job, assess the condition of your existing paint job to determine the necessary materials and scope of your project. If you are merely changing the color of your paint, which is in good condition, you will not need to strip any existing paint or coarse sandpaper to expose the bare metal. If, however, there is damage to the paint, you will need the coarse sandpaper, primer paint, and also catalyzed glazing putty to fill in deep scratches or dents.
- **Note**: If you need to make such repairs on damaged areas (for example, if just your fender is damaged, only sand that fender down to the metal, fill in any damaged areas, and apply primer to that portion; the rest of the vehicle only needs a light wet sand before applying the base coat).

Part 2 of 3: Preparing your car

Step 1: Prepare your car. Remove any components you don't want painted or cover them with broad sheets of paper or plastic and masking tape.

Step 2: Sand the target surface. In damaged regions, prepare your exterior surface and strip the existing paint by sanding with a rough grit (like 360-grit) paper. Although this can be done by hand by rubbing in a back-and-forth motion until the bare metal is exposed, the job is far easier when the paper is used with an electric orbital sander.

Step 3: Fill in any dents. Fill any dents or deep scratches with catalyzed glazing putty. Once it hardens, usually within a day, sand it smooth with the rough grit paper.

Part 3 of 3: Painting your car

Warning: Wear a protective face mask when working to prevent the inhalation of dust and harmful fumes.

Step 1: Use primer. If you repaired paint damage, you must apply a spray primer paint to create a surface to which the base coat can adhere. Spray the primer evenly in broad back-and-forth strokes and allow to thoroughly dry (up to 24 hours) before moving on in the process.

Step 2: Wet sand the target area. Submerge fine grit (around 3000-grit) sandpaper in a bucket of water for one to three minutes, then lightly sand the surface of your existing paint or primer by hand or using an orbital sander. The surface must always be wet, so add water or swap out the paper in your water bucket as needed.

If you opt to sand by hand, wrap the paper around a rubber block to apply even pressure.

Step 3: Dry your vehicle. Ensure there is no moisture on the vehicle's exterior by cleaning it with denatured alcohol, or another painting prep solvent, and a clean cloth.

Step 4: Paint the target area. Connect the moisture separator filter to the paint gun and the air compressor to the filter, then fill with the automotive base coat paint of your choice. Spray your vehicle in smooth strokes, overlapping those strokes by about 50 percent, while holding the sprayer between 6" and 10" from the exterior.

Step 5: Allow paint to dry. After allowing the base coat to air dry according to your particular paint product's instructions (at least a day), wet sand the surface again.

Step 6: Clean and apply clear coat. Clean the surface with denatured alcohol and a clean cloth another time, then apply the clear coat in the same manner you did the base coat.

Step 7: Buff your vehicle. After the clear coat dries according to its instructions (approximately 24 hours), remove all of the tape and plastic or paper. Then, buff the surface with a buffer and buffing compound in a circular manner to reveal your paint job's maximum shine.

Tip: Apply two to three coats of base for the best coverage, waiting 5 to 10 minutes between coats to prevent flash-off, a chemical reaction that results in a hazy appearance.

Tip: If you make a mistake or an area is otherwise damaged during the process, you can always start over in that region with sanding.

While it is possible to apply a base coat and/or clear coat of automotive paint on your own, it is a time-consuming process using materials that are relatively expensive,

depending on the choice of paint. Bearing in mind that your time also has value and that there is a potential of a novice painting attempt turning out badly, it may be in your best interests to enlist a professional's help.

Information Sheet 2-Appling refinishing materials at manufacturer/ component supplier recommended intervals using approved methods

Drying room

A dust-free drying room will speed up drying, turn out a cleaner job, and increase the volume of refinishing work that can be handled. The drying rooms of more sophisticated paint shops have permanent infrared or sodium Quartz units for the forced drying of paint, particularly enamels. These oven-like units can speed up the drying

Time of enamels by as much as 75 percent. The use of forced drying on putty, primer, and sealer oats will reduce waiting time between operations and can also be used for fast drying spot and panel finish coats. Infrared or sodium quartz drying equipment is available as portable panels for partial or sectional drying. Drying equipment also takes the form of large traveling ovens capable of moving automatically on a Track over the vehicle to dry an overall job. There are two types of infrared drying equipment:

- Near drying equipment. Because drying equipment uses lamps as the heat source, this type of equipment is easy to handle. The radiation angle can

Be easily varied. The construction, relocation, and assembly are simple, so it is the most common type used for automobiles. There are several shapes and sizes of this equipment, depending on what it is used for.

- Far drying equipment. Far drying or sodium quartz equipment affects paint drying by means of heat radiated from a tubular or plate-type heater. The heat source is either gas or electricity. Far drying equipment also comes in various types and sizes, depending on its intended use. Drying can best be accomplished in a separate drying chamber attached to the back of a downdraft system or conventional drive-through booth where the traveling oven is housed and operated. This configuration achieves the highest production because both the painting and drying operations can be performed simultaneously. Drying can also be performed directly in the spray booth after painting. A storage vestibule is used to store the traveling oven until it is needed. After the vehicle is painted, the oven is rolled out of the vestibule and into the spray booth for the drying operation. When using a drying room, certain precautions must be taken not to destroy the finish.

gives the common difficulties that can be caused in the drying room. Many shops are now using a UV (ultraviolet) primer to speed paint repairs. Small areas can be sprayed with the UV primer and cured in a couple of minutes by exposure to a UV heat lamp. The primed area can then be painted after very little drying time.

AIR-SUPPLIED RESPIRATORS

An *air-supplied respirator* circulates fresh air over the painter's face. It is the most common type of respirator used by painters and refinish technicians. By forcing fresh air over the painter's nose and mouth, harmful paint contaminants cannot pass around or through the respirator. There are two common types of air-supplied respirators: the hood type and the face shield type. Either type must be worn when spraying catalyzed paint materials. A *full hood fresh air respirator* covers a painter's head and face. A fresh air hose connects to the hood. One is shown in Figure. A *face shield fresh air respirator* uses a clear plastic shield with a small air nozzle to direct breathing air over the painter's face. As with the hood type, an extra fresh air supply hose is attached to a small hose going to the air nozzle. Note how the fresh-air respirator connects to shop airline pressure. A carbon filter is needed before the respirator to make the air breathable. Clean air can then flow through the respirator feed tube.

A simplified booth layout for a fresh air–supplied respirator is shown in Figure 24–73, page 818. Note that separate air lines are provided for the spray gun and respirator. The air intake for the respirator is normally located on the outside of the shop. This keeps fumes and dust from being pulled into the system. Also note that a small dedicated air compressor can be used to pump air to the respirator. It is very important that you periodically replace the fresh-air respirator filter. It can normally be replaced by Unscrewing a cover over the element. Refer to If shop air pressure is going to be used for an air- supplied respirator, additional in-line filters and a desiccant drying unit are needed. They will clean the shop air enough for breathing

Information Sheet 3- Dried refinishing materials by using approved methods and equipment

2.1Introduction

Drying techniques, along with other detailing processes, are essential for maintaining the appearance, extending the longevity and improving the functionality of your vehicle. However, it is important to know that there are several methods of drying a vehicle. This is to protect your vehicle's surface from premature damage. Drying Techniques that Every Vehicle Owner Should Know Here's a common misconception about drying a vehicle: any method works as long as it removes water from the surface. As detailing experts, we know that this isn't true. When it comes to efficient drying techniques, you should consider the color and type of finish your vehicle has (matte or high gloss, glass coating, car paint film, etc); the weather in your area, and the size of your vehicle.

Before using any of the drying techniques listed below, make sure that your vehicle is totally free of dust and dirt to prevent the occurrence of paint swirls or scratches.

Techniques Listed

To facilitate this technique, use a car wash drying agent.

Master Blaster / Leaf Blower

These equipment blast away all excess water from a vehicle's surface. Some car enthusiasts prefer using them over other drying techniques. Since a master blaster/leaf blower "blows" excess water away, there's no need to rub, thus reducing the chances of car paint swirls or scratches. Make sure that you do your "blowing" in an enclosed, dustless area to keep outdoor dust and dirt away from your vehicle's surface. Using a master blaster for drying your vehicle during winter time is a good idea too. It can blow away every single drop of liquid – even water from small crevices of your car or truck.

Water Blade

This is one of the drying techniques that has gained popularity among car owners. It's cheap and simple to use. A word of caution though – you need to have a surface that has 0% dust or dirt because if these contaminants get under the blade, there's a huge chance that your vehicle's finish will be scratched.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

1.

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1.---------- 2. ----------

.

LG #29	LO #8- Clean up work area and maintain equipment

Instruction sheet

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

- Collecting and storing reused material**.**
- Removing waste material according to workplace and environmental procedure.
- Cleaning and inspecting equipment and work area for serviceable condition in accordance with workplace procedures.
- Identifying tagged and faults unserviceable equipment in accordance with workplace requirements.
- Completing operator maintenance in accordance with manufacturer/component supplier specifications and worksite procedures.
- Maintaining tooling is in accordance with workplace procedures.

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

- Collect and storing reused material.
- Removing waste material according to workplace and environmental procedure.
- Clean and inspecting equipment and work area for serviceable condition in accordance with workplace procedures.
- Identify tagged and faults unserviceable equipment in accordance with workplace requirements.
- Complete operator maintenance in accordance with manufacturer/component supplier specifications and worksite procedures.
- Mainta tooling is in accordance with workplace procedures.

Learning Instructions:

Information Sheet 1- Collecting and storing reused material

Housekeeping Signs

The workplace or office is a place where productivity is expected and having a pleasant work area certainly adds to a positive environment. Employees can do their part in addition to regular cleaning staff housekeeping and caretaker maintenance to keep it clean, safe, and healthy for all.

Collecting and storing material that can be reused

The proper care and storage of materials, tools and equipment's are not only the concern of the management but of the workers who use the equipment.

A major responsibility of the technician is to ensure that materials, tools and equipment are maintained in a good condition and are readily available when required for the various work activities. Faulty tools and equipment's are a common reason for delays on technical activities.

Good organization of stored materials is essential for overcoming material storage problems whether on a temporary or permanent basis. There will also be fewer strain injuries if the amount of handling is reduced, especially if less manual materials handling is required. The location of the stockpiles should not interfere with work but they should still be readily available when required. Stored materials should allow at least one meter (or about three feet) of clear space under sprinkler heads.

Importance of proper storage of tools and equipments

- It is important factor for safety and health as well as good business.
- Improves appearance of general-shop and construction areas.
- Reduce overall tool cost through maintenance.
- This also ensures that tools are in good repair at hand.
- Teaches workers principles of tool accountability.

Pointers to follow in storing tools and equipments

- Have a designated place for each kind of tools.
- Label the storage cabinet or place correctly.
- Store them near the point of use.
- Wash and dry properly before storing.
- store sharp edge materials properly when not in use with sharp edge down.
- Put frequently used items in conveniently accessible conditions.
- Gather and secure electrical chord to prevent entanglement or snagging.
- Cutting boards should be stored vertically to avoid moisture collection
- Metal equipments can be stacked on one another after drying.
- Make sure the areas where you are storing the equipment are clean, dry and not overcrowded.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: choose the best answer

1. Importance of proper storage of tools and equipments

A. Teaches workers principles of tool accountability
B. Improves appearance of general-shop and construction areas
C. Reduce overall tool cost through maintenance
D. All

2. Pointers to follow in storing tools and equipments

A. Label the storage cabinet or place correctly
B. Wash and dry properly before storing
C. Store them near the point of use.
D. All

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1.---------- 2. ----------

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Information Sheet 2 - Removing waste and scrap

Waste Disposal Practices

There are eight major groups of waste management methods, each of them divided into numerous categories. Those groups include source reduction and reuse, animal feeding, recycling, composting, fermentation, landfills, incineration and land application. You can start using many techniques right at home, like reduction and reuse, which works to reduce the amount of disposable material used.

Methods of Waste Disposal

Landfill:- which is the most popularly used method of waste disposal used today. This process of waste disposal focuses attention on burying the waste in the land

Incineration/Combustion:- which is a type disposal method in which municipal solid wastes are burned at high temperatures so as to convert theminto residue and gaseous products..

Recovery and Recycling:- It is the process of taking useful discarded items for a specific next use. These discarded items are then processed to extract or recover materials and resources or convert them to energy in the form of useable heat, electricity or fuel.

Recycling is the process of converting waste products into new products to prevent energy usage and consumption of fresh raw materials. Recycling is the third component of Reduce, Reuse and Recycle waste hierarchy. The idea behind recycling is to reduce energy usage, reduce volume of landfills, reduce air and water pollution, reduce greenhouse gas emissions and preserve natural resources for future use.

Plasma gasification:- It is another form of waste management. Plasma is a primarily an electrically charged or a highly ionized gas. Lighting is one type of plasma which produces temperatures that exceed 12,600 °F .With this method of waste disposal, a vessel uses characteristic plasma torches operating at +10,000 °F which is creating a gasification zone till 3,000 °F for the conversion of solid or liquid wastes into a gas.

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Write short and precise answer

1. List methods of Waste Disposal

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

You can ask you teacher for the copy of the correct answers.

Score = _____
Rating: _____

Answer sheet

Test I

1.---------- 2. ----------

.

Cleaning up is not just a measure of respect for the workspace, it also removes hazards. Plan to easily and regularly remove trash and debris. Enforce a strict cleanup policy throughout the workspace. Keep work areas tidy as well by minimizing the number of wires running around. Extension cords quickly become tripping hazards, and power strips also cause trouble on the ground or as they tumble erratically on a desktop. We suggest you provide access to grounded outlets all along the perimeter of the room and/or dropped from the ceiling for each workbench.

Kinds of Cleaning Solvents

Solutions are homogeneous mixture of two or more components. They can be gaseous, liquid or solid. When we speak of a solution, we usually think of a solid dissolved in water. While water is the most common solvent, other liquids are frequently employed as solvents for certain substances for example wax maybe dissolved in gasoline. The dissolved material in a solution is termed as solute (e.g. wax) while the dissolving medium is called solvent (e.g. gasoline). However, the term can be interchanged depending on which substance is of greater amount.

Solvent is a component of a solution that dissolves solute and is usually present in large proportion or amount. It can be classified as polar or non-polar. Polar solvents are solvents which dissolve/are soluble in water; while non-polar solvents are solvents which do not dissolve/are insoluble in water.

Solvents usually used for cleaning in automotive shops are: water, gasoline, kerosene, thinner and detergent soap.

The table below shows the kinds of cleaning solvents based on their solubility in water.

Cleaning Solvents	Solubility in Water	Polar	Non polar
a. Water	soluble	x	
b. gasoline	insoluble		x
c. kerosene	insoluble		x
d. thinner	insoluble		x
e. detergent soap	soluble	x	

Properties of Cleaning Solvents

A useful generalization much quoted is that “Like dissolves like”. More specifically, high solubility occurs when the molecules of the solute are similar in structure and electrical properties to the molecules of the solvent.

When there is a similarity of electrical properties; e.g. high dipole element between solute and solvent, the solute-solvent attractions are particularly strong. When there is dissimilarity, solute-solvent attractions are weak. For this reason, a polar substance such as H2O usually is a good solvent for a polar substance such as detergent soap but a poor solvent for a non polar substance such as gasoline.

Uses of Cleaning Solvents

Cleaning Solvents	Uses
1. Gasoline	- It is used to wash oil/greasy tools/equipment.
2. Diesoline	- It is used to wash oil engine, transmission and other parts of the vehicle.
3. Kerosene	- It is used to remove dust, grease oil, paint, etc.
4. Thinner	- It is used to remove spilled paint on the floor, walls and tools.
5. Soap and water	- It is used to wash/clean upholstered furniture such as seats, tables, cabinets, etc.

Occupational Health and Safety Practices in Handling Cleaning Solvents

A great percentage of eye injury and cuts results from a disregard for the simplest of rules in handling cleaning solvents. You should never use compressed air to clean your clothes, hands or body. The pressure could cause the cleaning solvents and dirt particles to penetrate your skin, resulting in infection and /or blood poisoning. Do not use compressed air to clean an object immediately after it has been removed from a hot cleaning tank. First, rinse the cleaning solvents away with water. Do not use carbon tetrachloride as a cleaning solution. The fumes, when inhaled can cause serious internal injury and possibly result in death. When steam-cleaning, place the object to be cleaned on a pallet and wear a face shield and rubber gloves for protection against loose debris.

If a job or cleaning task requires the use of gloves, use the appropriate gloves. Do not for instance use welding gloves when removing an object from a hot tank, or rubber gloves when welding. If you have cut, nicked, or burned yourself, or something has got into your eyes, report immediately to the first-aid person.

Keep all inflammable cleaning solvents in closed tin containers and whenever possible, store them in a separate area.

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Instruction I : match column "A" with "B" (2points each)

"A"	"B"
-----1. kerosene	A. used to wash oil/greasy tools/equipments
-----2. Gasoline	B. used to wash oil engine, transmission and other parts of the vehicle
-----3. Diesoline	C. used to remove dust, grease oil, paint, etc
-----4. Thinner	D. used to wash/clean upholstered furniture such as seats, tables, cabinets, etc
-----5. Soap and water	E. used to remove spilled paint on the floor, walls and tools.

5 and above correct answered points passed mark.

Information Sheet 4- Tagging unserviceable equipment and identifying faults

TAGS

The use of tags is considered an administrative control and as such only provides limited protection to people and plant; therefore in all cases a physical isolation must be used in conjunction with a tag to prevent the accidental activation of an isolation point.

Attaching the Tag

The person attaching the tag must completely fill the tag with the following information:

- Name & company of person placing tag
- The classification/department the person works for
- The date that the tag was placed
- The equipment / plant the tag was placed on
- Contact number
- Work order / job number if applicable
- Signature

It is important to clearly identify the exact piece of equipment that the tag and lock was placed on to allow identification of those personnel working on the plant.

Depends on what you need it for. You can include a stub to give to your customers, or feature numbering so you can easily track each defective part. Choose materials with a bit more durability if you'll be working outside, replace old tags, or fasten your tags to something new.

- We specialize in Repair Tags and we stock several different options for whatever suits your space. Check out our repair tag material guide to compare.
- All tags feature smudge-proof surface. Write your information with a pen, pencil, or marker.
- Bright colored repair and inspection tags with bold, legible prints display and highlight vital information.
- Order tags with our handy Tag-in-a-Box for convenient storage and dispensing of tags. Just pull and tear!

- Looking for the right fit? Get a custom design. Our customer service staff is happy to help you find what you need.

Self-Check – 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

1. Mention six information must completely fill the tag during a person attaching the tag (6 pts)

Note: Satisfactory rating - 3 points & above Unsatisfactory - below 3 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet 5- Completing operating maintenance in accordance to worksite procedure

Tools and Equipment Maintenance

All tools, equipment and vehicles must be properly maintained so that workers are not endangered. Construction regulations require inspections of vehicles, tools, machines and equipment before use.

components of maintenance program

A maintenance strategy includes procedures as well as corrective and preventive maintenance..

1. Corrective maintenance (cm) restores the function of a failed device and allows it to be put back in to service.
2. Preventive maintenance (pm) aims to extend the life of the tools/equipment and reduce failure rates. Preventive maintenance is the systematic care and protection of tools, equipment, machines and vehicles in order to keep them in a safe, usable condition, limit downtime and extend productivity. We must always be aware that maintenance tasks themselves are potentially hazardous and can result in injury.

Inspections ensure that tools and equipment's are operating correctly. Safety inspections ensure the tools/equipment are safe for both patients and operators

The successful maintenance program is:

- Well organized and scheduled,
- Controls hazards,
- Defines operational procedures, and
- Trains key personnel.

Self-Check – 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

1. ---------- restores the function of a failed device and allows it to be put back in to service.

   A. Preventive maintenance C. Corrective maintenance

   B. Inspections D. None

2. The successful maintenance program is:

A. Well organized and scheduled

B. Controls hazards

C. Defines operational procedures

Information Sheet 6- Maintaining tooling in accordance with workplace procedures.

Tools need to have enough space to be operated safely and not endanger the operator or other people in the space. People need to concentrate when trying new tools, especially ones that can injure. Make sure there is enough real estate to use a tool safely. Work areas need to be well lit and clean. Ventilation and/or air filtering is required for many tools.

The equipment itself needs to be as safe as possible. Tools should be well maintained and not have safety features removed or defeated. This is especially important when using second-hand tools that might not have a perfectly safe heritage. When acquiring new tools consider spending the extra money on models with advanced safety features, such as a Saw Stop table saw.

Make well-stocked first-aid kits visible and easily accessible throughout your space. Post clear and visible warning signs on all equipment and where necessary.

Provide personal safety equipment such as goggles, earplugs, gloves, etc. to those who don't have their own.

Accidents may happen. They probably will, and let's hope they are all minor. Nonetheless, do make sure that there is a legal entity that owns the space so that the effects of a serious injury don't extend the horror with legal ramifications

Self-Check – 6	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

1. Which of the following are false during maintaining tooling
   A. tools not endanger the operator or other people in the space.
   B. The tools itself not needs to be as safe as possible
   C. Tools should be well maintained and not have safety features removed or defeated
   D. Tools need to have enough space to be operated safely

Note: Satisfactory rating - 1 points & above Unsatisfactory - below 1 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer Questions

Operation Sheet 1– Cleanup work area and maintain equipment

Objectives of conducting cleanup work area and maintain equipment

Procedures to ensure the job gets done safely and without delay

1. Clean up every time whenever you leave an area, including sweeping the floor.
2. Clean and return all tools to where you got them.
3. Use compressed air sparingly; never aim it at another person or use it to clean hair or clothes.
4. Shut off and unplug machines when cleaning, repairing, or oiling.
5. Never use a rag near moving machinery.
6. Use a brush, hook, or a special tool to remove chips, shavings, etc. from the work area. Never use the hands.
7. Keep fingers clear of the point of operation of machines by using special tools or devices, such as, push sticks, hooks, pliers, etc.
8. Keep the floor around machines clean, dry, and free from trip hazards.
9. clean up and dry spills immediately and put a chair or cone over them if they are wet enough to cause someone to slip.

LAP TEST	Performance Test

Name…… ID……Date……

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **3** hour. The project is expected from each student to do it.

Task 1: Performing Cleanup work area and maintain equipment

Reference Materials

Book:

WEB ADDRESSES

https://www.depaulachevrolet.com/different-types-of-car-paint-what-you-need-to-know/
https://www.rustoleum.com/product-catalog/consumer-brands/auto/general-purpose-paints/acrylic-lacquer
https://www.inspection-for-industry.com/paint-inspection-services.html

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