



Ethiopian TVET-System



Furniture Making L-II

Based on Sept. 2012G.C. Occupational standard

Module Title: Applying Finishing Touches

TTLM Code: IND FMK2 TTLM 0919v1

This module includes the following Learning Guides

LG19: Plan and prepare for work

LG Code: IND FMKII M06 LO1-LG19

LG20: Prepare surface and materials for finishing process

LG Code: IND FMKII M06 LO2-LG20

LG21: Color / stain is applied to product surface

LG Code: IND FMKII M06 LO3-LG21

LG22: Apply finishing material

LG Code: IND FMKII M06 LO4-LG22

LG23: Clean up

LG Code: IND FMKII M06 LO5-LG23



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

- Basic project work requirements
- Quality assurance requirements
- OHS and PPE requirements

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

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

- Identify basic surface finishing materials
- Selecting Tools and Equipment's with job requirements
- Describe Safety rules for apply finishing

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 5.
3. Read the information written in the information “Sheet 1, Sheet 2, and Sheet 3.
4. Accomplish the “Self-check 1, Self-check 2, and Self-check 3” in **page -12, 14 and 17** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, in **page -18.**



1.1 Basic project work requirements

Wood finishing

Wood finishing applies to the application of selected material such as stains, filler, varnishes, lacquer, paints, enamels and waxes to a wooden surface. The application of these materials prevents the tendency of the wood to moisture, fumes and oils that may cause shrinkage, swelling, warping and discoloring. The ultimate reason for applying finishes by a wood worker is to enhance the natural beauty of the timber or hiding its blemishes.

When you're choosing a finish for any given project, you should take each of these qualities into account:

- Appearance
- Protection
- Durability
- ease of application
- Safety
- Reversibility
- ease of rubbing

1.1.1. Basic surface finishing materials

Furniture and cabinet works improve their appearance and increase their values, if the preparation of wood for finishing is done properly. But, it is not only the quality of preparation improves appearance and increases value but also the selection of finishing materials and supplies have a great role in determining quality finish in wooden products. Therefore, it is important to identify/know what type of finish? Which finishing material and supplies? , are going to be used for the identified wood species. It usually consists of several

- ✓ Coats of wax
- ✓ Shellac
- ✓ stain



- ✓ Lacquer
- ✓ Varnish
- ✓ Paint
- ✓ Sealer

A. Varnish

Varnish is one of the transparent finishing materials made from gum resins and oils. It has excellent quality of transparency, depth, durability, and hardness. It dries slowly and requires a dust free area when being applied and while it is drying.

Varnish is transparent finishing material that has been used to beautify and preserve materials especially wood. Varnish as a finish on wood is unsurpassed by any other type of finishing material. It is especially noted for its durability, hardness, transparency, and depth of film.

Varnish is made from natural copal gum resin or from man-made synthetic resins gum. Many fine varnishes are made from natural copal gums, but the general trend is towards the use of synthetic varnishes because of their fast drying qualities. Copal gums are the most important ingredients in the manufacturing of natural varnish. They are resinous substance found on decayed pine trees which grew several hundred years.

Purpose of varnish

Two chief purposes:

- For preservation of the material
- For development of beauty

Preparing the surface for varnish

1. Complete the final sanding, remove dust, and examine the surface for marks and dirt.
2. Sponge all surfaces with water. Let it dry for 12 hours. The sponging raises the grain of the wood.
3. When dry, sand all surfaces with 5/0 garnet paper or any other fine sand paper. Remove all the dust with clean cloth.
4. If the piece is to be stained, it should be done at this time.
5. If necessary apply a wash coat of white shellac to seal the stain.
6. Allow 8 hours for this coat to dry and then sand it lightly with the grain by very fine sand paper.
7. If it is open grained wood apply paste filler, allowing it to dry for 24 hours.
8. Sand the filler coat with very fine sand paper, when dry.

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9. Seal the filler with a coat of wash shellac. When dry sand again with very fine sand paper.
10. If closed grained wood is used proceed from step no. 6 with the varnish finish.

Applying varnish

1. Select the right kind of varnish and a long haired varnish brush of good quality and clean.
2. Have a clean jar container at hand.
3. Open the can of varnish. Pour in to the glass jar container enough of varnish for the first coat. Quickly put the lid back on the can and press it down tightly.
4. Pour a small quantity of turpentine into the varnish to thin it down for the first coat.
5. Dip the brush into the varnish lightly to prevent the formation of bubbles. Remove the surplus on the edge of the container.
6. Brush the varnish from the center towards the outer edges. This will prevent the varnish from running the edges.
7. When the first coat of varnish is applied, clean the brush carefully in turpentine and wrap it in a piece of clean paper for storage.
8. Allow the surface to dry thoroughly.
9. When dry, sand carefully with very fine sand paper with the grain. Feel for smoothness with your fingertips.
10. Brush off the particles resulting from the sanding and wipe the surface carefully with the clean cloth dampened with turpentine.
11. Apply the second coat of varnish.
12. Allow the second coat to dry for 48 hours.
13. Apply the third or last coat you did the second coat.
14. Clean the brush with turpentine and wrap it with a clean piece of paper when you are through using it.
15. Allow third or final coat to dry for 3 or 4 days.
16. Apply one or two coats of wax as a final touch for the rubbed varnish finish.

B. SHELLAC

Shellac is a resinous substance produced on from certain species of tree in the jungles of India, Siam, Ceylon and other far eastern countries. It is deposited on the bark, branches and twigs of these trees by insects known as the Lac insects. These many

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insects attack certain trees in Asia, suckling the sap and producing a resinous secretion or gum. Then the gum is melted, squeezed through cloth bags, and placed in shallow vats (large container for liquid) to cool where it becomes solid sheets which forms the dry shellac which comes to finish and painter.

The natural color of shellac is bright orange. White shellac is prepared by bleaching orange shellac by a chemical process. The best grades of shellac are those which are most free from impurities. Since most impurities are dark in color it follows that the lighter colored shellacs are apt to be the best.

A good mixture is 4 pound of shellac to 1 gallon of alcohol. Alcohol is used with shellac as a thinner and it is also used for cleaning the brush.

Preparing the surface

1. Remove tool marks, dirt from the project.
2. Sponge the surface with water and let it dry for 12 hours. The water application raises the grain of wood.
3. When dry, sand the surface and edges with fine sand paper. Remove all dust with cotton cloth.
4. If the project is to be stained, it should be done before shellac is applied.

Applying shellac

1. Put a small amount of shellac into an open container and thin 1 part of shellac to 7 parts of alcohol.
2. Select a fine brush with long good quality bristles.
3. Apply the first coat of wash shellac as evenly as possible with long, fast, even strokes, brush one way from the center of the surface to the outside and apply light pressure. Allow at least 8 hours for the first coat to dry.
4. After drying, sand it very lightly with very fine sand paper.
5. Apply filler for open grained woods.
6. Thin shellac until it is one half of alcohol. Stir the mixture.
7. Apply the second coat of shellac. Apply it evenly and quickly because it dries rapidly.
8. Allow eight hours for the second coat to dry, and then sand it lightly with a very fine sand paper and remove the dust.
9. Apply the third shellac coat and allow 24 hours to dry and again sand lightly with very fine sand paper.
10. Wipe the surface clean, use dry cotton cloth.

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11. If you desire a final shellac finish, put on another coat of two-thirds shellac and one third alcohols, dry at least for 24 hours.
12. Smooth it lightly with very fine sand paper and clean with cotton cloth.
13. Put a coat of good furniture wax; allow it to dry for 20 minutes.

C. Lacquer

The term lacquer is in a broader sense than to refer only to lacquers that contain nitrocellulose. There is no nitrocellulose, for instance, in acrylic lacquer. This lacquer is applied to many surfaces, but not often to wood because of its high cost. By combining acrylic resin with cellulose-acetate-butylate (CAB), a resin closely related to nitrocellulose, the principal quality of acrylic lacquer, its non-yellowing, can be captured at a lower cost.

Advantages of Lacquer

- ❖ Possibility of invisible repair.
- ❖ Much reduced runs and sags when spraying.
- ❖ Ease of achieving a dust-free, blush-free, and over-spray free finish in all types of whether. (More problem-free application).
- ❖ Ease of use in combination with stains, glazes, paste wood fillers, and toners for a wide range of decorative effects. (Use in decoration).
- ❖ Excellent depth and beauty.
- ❖ Excellent rubbing qualities/properties.
- ❖ Relative ease of stripping.
- ❖ With the addition of slower or faster evaporating thinners, can be applied in all types of weather.
- ❖ Very fast drying.
- ❖ Easy to polish, no needed expensive equipment.

Disadvantages of lacquer

No finish is perfect, and lacquer has several significant problems. These include the following:

- ❖ Reduced protection and durability.

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- ❖ Slow build.
- ❖ Tendency to blush in humid weather.
- ❖ Susceptibility to fish-eyeing.
- ❖ The solvents are toxic, flammable, and air polluting.
- ❖ Moderate heat, wear, solvent, acid, and alkali resistance.
- ❖ Moderate water and water-vapor resistance.
- ❖ It is difficult to apply with brush b/se it has a rapidly drying rate,
- ❖ It requires a sealing coated over (varnish

Applying lacquer

Lacquer is used as a finish on furniture, hardware, jewelry, all automobiles, sport equipment's, etc. It is best applied by brushing, dipping, or padding. The surface to be lacquered should be clean, dry and devoid of oil and wax. The surface may first be under coated with shellac or lacquer thinner.

➤ **Here are the procedures when you use the spraying method.**

1. Thin the lacquer to be used with a recommended thinner (lacquer thinner), use a proportion of two-part lacquer to three-parts thinner.
2. Adjust the nozzle of the spray gun until the desired spray is obtained.
3. Press and hold the trigger of the spray gun until the nozzle is 12-15mm above along the whole length of the surface with a slow, a seeping motion. Each stroke should overlap the last sufficiently to blend in with the previous coat.
4. Use a minimal amount to prevent lapping or lifting previous coats.
5. Clean the brush soon after use; thinner first and then water and soap.

D. Paint

Paint is available in a variety of colors with either an oil-base or latex (rubber) base. They can be used for both interior and exterior surfaces. Paints are often used to beautify and protect surfaces where an opaque finish is appropriate. Oil-based paint is reduced with turpentine or mineral spirits, and usually requires at least 24 hours of drying time for each coat.

1.1.2. Selecting Tools and Equipment's with job requirements

There are only four tools for applying finishes: rags, brushes, rubbing pads, and spray guns. This minimal tool kit is a main difference between finishing and woodworking. In woodworking there are countless tools, with new ones coming on the market all the

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time. If you're a woodworker, you spend a good deal of time learning about the different tools, how they work, and the tricks they're capable of.

I. Rags

The rags you use in finishing should be made of cotton. Polyester and other synthetic fabrics don't work well because they aren't absorbent enough. You can often substitute cheap paper towels for cloth rags if you don't have a supply of used rags-especially when working with products that don't contain water. When working with products that do contain water, you can substitute Scott Rags, which are a paper product available at many home centers and discount stores. These rags won't fall apart when they get wet.

II. Brushes

Brushes are among the earliest finishing tools. Though the increasing popularity of spray equipment is making brushes less important, it's rare that a finisher doesn't own at least a few brushes.

Choosing a Brush

A good-quality brush is important if you expect good results. Good-quality brushes hold more finishing material (so you don't have to replenish the brush as often), and they spread the material more smoothly than poor-quality brushes. It is important to select the right brush to the right work.

There are three types of brushes: **natural bristle, synthetic bristle, and sponge.**

There are also pad applicators, which may be regarded as a type of brush, since they are used in the same manner.

III. Rubbing Pads

Rubbing pads are very useful tools for French polishing and padding, and for rubbing out finishes. Make your own rubbing pad with two pieces of cloth-an outer cloth that doesn't stretch and an inner cloth that will absorb and hold liquid. Tightly woven cheesecloth, cotton, or linen is best for the outer cloth. Loosely woven cheesecloth, T-shirt cotton, or sweater wool is best for the inner cloth. (Polyester and other synthetics don't work well for either the outer or inner cloth.) Wrap the outer cloth tightly around a wad of the inner cloth to make the pad, as shown in Photos Draw the outer cloth tight during use to remove wrinkles from the bottom of the pad.

IV. Spray Guns and Equipment

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A **spray gun** is the most efficient of the four tools for applying finishes. You can lay down an almost perfectly smooth and level coat of finish on a large surface in a short time. Spray guns shoot a stream of fluid that is broken up into a mist of tiny droplets by two jets of air coming out of the horns on the air nozzle. The droplets hit the wood and flow together to make a smooth film. The breaking up of the finish into droplets is called atomization. It's important that the atomization be thorough, or the droplets won't flow together well.

❖ **Basic spring equipment for spray finishing**

- I. **Compressor**: is a machine that takes air from the atmosphere, compressor it.
The air is supplied either by an electrical motor or by gasoline engine
- II. **Air transformer**: as the compressed air moves one it way to the gum.
It first phases through a transformer and spry gun.
- III. **Spray gun** is heart of finishing system the gun is pressure feed.
The spray gun is attached to the air hose
- IV. **Air hose**: air hose caries air from the compressor and transformer to the spray gun.

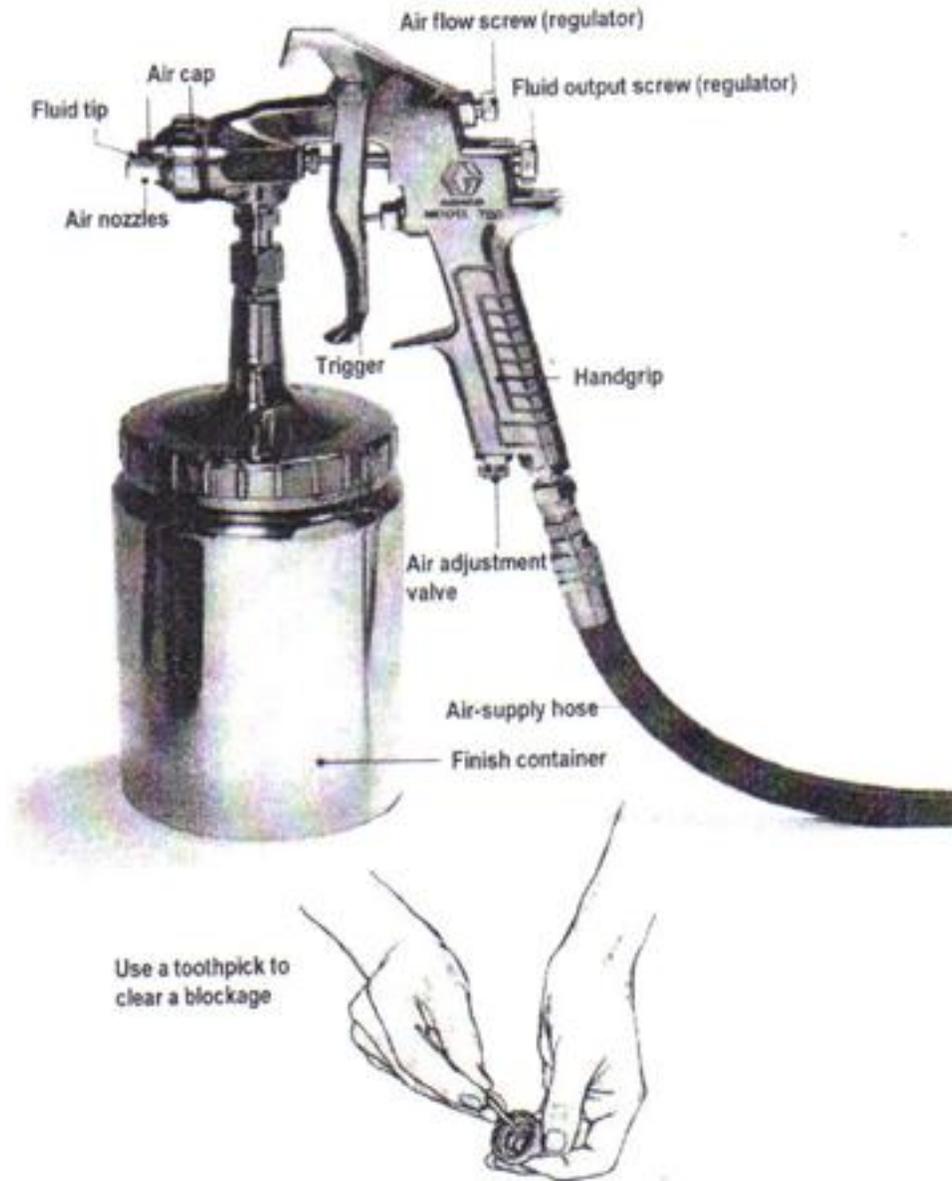
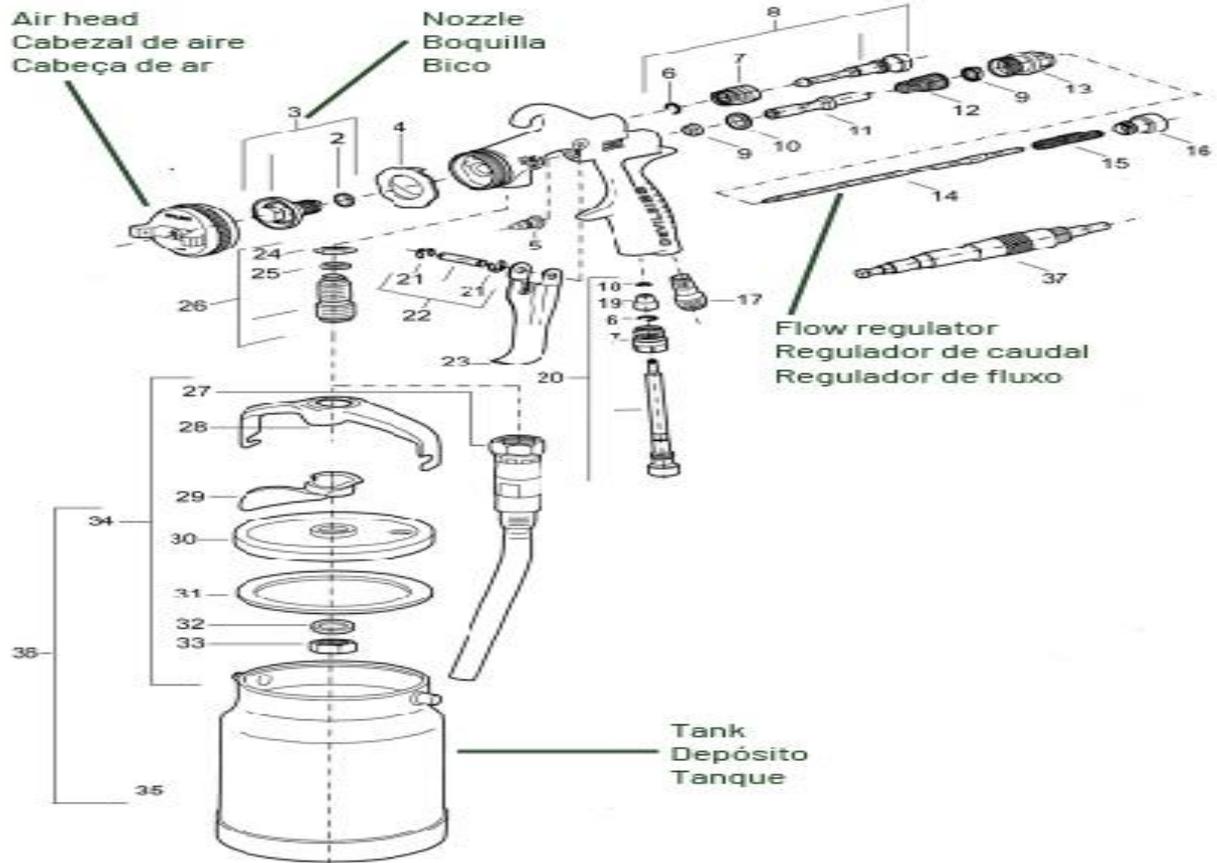


Illustration of spray gun

There are two common types of spray guns used in finishing, and two common sources of air to the guns:

- Conventional (low volume/high pressure) spray guns work with compressed air and blast the finish onto the wood at 25 to 80 psi (pounds per square inch).
- HVLP (high volume/low pressure) spray guns work with either compressed air or turbine air and lay the finish onto the wood softly at 4 to 10 psi. These guns create much less overspray.

Parts of a spray gun





Self-Check -1

Written Test

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

1. _____ is the most important step of that is used to remove imperfection in surface and making smooth. (2 points)
A. Sanding B. Varnish C. Remove defects D. Applying
2. _____ is transparent finishing material that has been used beautifying & preserve material. (3 points)
A. Varnish B. Lacquer C. shellac D. stain
3. _____ Which one of the following is the disadvantage of Lacquer? (3points)
 - a. Excellent depth and beauty.
 - b. Excellent rubbing qualities/properties.
 - c. Relative ease of stripping.
 - d. Reduced protection and durability

Note: Satisfactory rating - 3 and 5 points Unsatisfactory - below 3 and 5 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____



2.1. Recognizing quality assurance requirements

Quality Assurance

Quality assurance is a system of management activities involving planning, implementation, assessment, and reporting to make sure that the end product (i.e., environmental data) is of the type and quality needed to meet the needs of the user.

Quality assurance standards (or QA for short) are a set of **standards** that have been chosen and implemented by businesses all around the world to show commitment to delivering **quality** products and services to customers. Specifically, **quality assurance** (or QA) **standards** are about meeting customer and other **requirements**.

What skills are needed for quality assurance?

Key skills for quality assurance managers

- Confidence.
- Excellent technical skills.
- Good numerical skills and an understanding of statistics.
- Leadership skills.
- Planning and organization skills.
- Communication and interpersonal skills.
- Problem-solving skills.
- Team working skills.



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

1. What is Quality Assurance?(3pt)
2. What skills are needed for quality assurance?

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____



3.1. OHS and PPE requirements

3.1.1. Safety rules of finishing

Finishing materials inherently somewhat hazardous, because some finishing materials are volatile or explosive, these volatile/explosive finishing materials have a property of combustible (burnable). When improperly used these materials can cause a fire or they can explode. Some safety describes as follow:-

1. Wear a mask for respiratory if needed, in halation of toxic fumes is frequently the cause of lung diseases.
2. Protect the hands and body from infection. Example washing hands with volatile solvents may cause the skin to lose its natural oil as the result the skin becomes dry, crack, so wear rubber gloves when you working with such toxic liquids.
3. Provide adequate ventilation, lighting and exhaust system, proper ventilation reduced fire explosive and health hazards.
4. Store all chemicals in proper safe containers.

In order to get good results in applying wood finishes here are some general guides to follow: (1) work in a room where there is good ventilation;

(2) keep dust to a minimum;

(3) If possible don't sand and finish in the same room;

(4) remove all dust from the wood piece with a tack rag prior to applying the finish;

(5) work when room temperature is around 70 degrees F and the humidity is low;

(6) follow directions on the label;

(7) finish under parts and interiors before finishing the outside;

(8) Put all used rags into the garbage.

3.1.2. Safety precaution

When finishing wood, take the following precaution to safeguard health and safety:

- Most of the materials used to finish the wood are flammable, so store them in a separate building away from workshop and your house.
- Keep finishes and thinners locked away from children.



- Oily rags are a fire risk. They should be opened flat and allowed to dry out door before you throw them away.
- Install a fire extinguisher.
- Don't smoke while applying finishes.
- Inhaling solvent fumes can be very unpleasant, if not actually harmful. Follow manufactures' instruction with regard to toxicity, and wear a face mask or respirator.
- Provide adequate ventilation and don't spray finishes unless you have proper exhaust facilities.
- Wear protective gloves when applying wood stains.
- If you splash a finish in your eyes, flush them with water

3.1.3. Personal protective equipment (PPE) requirements

PPE is equipment that will protect the user against health or safety risks at work. It can include items such as safety helmets, gloves, eye protection, high-visibility clothing, safety footwear and safety harnesses. It also includes respiratory protective equipment (RPE).

Personal protective equipment's are

Eye Protection: Use safety glasses, chemical goggles or face shield as appropriate,

Hand Protection: Use heat resistant leather gloves,

Protective Clothing: Use long sleeved apron (shop jacket) overalls, fastened at neck and wrists,

Foot wear: Wear chemically and hared sole impervious safety shoes/boots,

Ear protective: Use safety ear pull, for highly noise,

Noise protection: Use safety dust music and dual cartage,



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

1. When finishing wood, what are the precaution to safeguard health and safety?(4pts)
2. State the rule of safety for finishing works?(3pts)
3. List and explain PPE ?3pts

Note: Satisfactory rating - 3 and 5 points Unsatisfactory - below 3 and 5 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

How to Painting Paint and Enamel

Purpose: It is often necessary to the paint and email to give uniform colors

Equipment, Tools and Materials: Paint, enamel and thinner

Conditions: Make sure that the paint and enamel is correct thinners, sanding and cleaning the

The steps in applying paint and enamel

Step1.Sand the surface of the project and to proper it for finishing

Step2.Read the direction on the container of the paint or enamel before opening it

Step3.Shake the container and take off the lid

Step4.Pour some of the liquid off the top into anther container

Step5.Stir the base mixture with a wooden paddle

Step6.Add turpentine ,linseed oil or thinner recommended ont5he point or enamel tin

Step7.Choose a good quality brush

Step8.Dip the brush in to the paint or enamel

Step9.Apply the point or enamel to the surface with along even stock

Step10.Allow the coat to dry according to the direction on the continuer

Step11.Apply second coat if necessary

Pre caution;

- *Keep your hands away from the dangerous area.*
- *Always keep the safety guard & safety cloth*
- *Make sure that the surface fine sanding*
- *Always return the paint and enamel is properly mixed with thinner*
- *Hold the brush firmly.*

Quality criteria; _ Smooth sanding
 _ make uniform the color



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

- Surface preparation procedures
- Repairing basic wood surface defects
- Identifying techniques, materials & process of finishing

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

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

- List of surface preparation techniques
- Repair Dents, Gouges, And Holes
- Identify tools ,techniques for apply finishing projects

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 4.
3. Read the information written in the information “Sheet 1, and Sheet 2.
4. Accomplish the “Self-check 1,and Self-check t 2, **in page -23 and 26**respectively.



2.1. Surface preparation procedures

Prepare the surface as follows:

1. Smooth the surface using a well sharpened smoothing plane.
2. Where possible raise the grain by applying water to the surface.
3. Where there are blemishes that are not too deep, scrape the surface with hand scraper.
4. Remove any traces of glue from the surface by scraping and sanding.
5. Remove any grease and oil by sponging with a lacquer thinner or benzene.
6. Stains that are not removed by sanding may be bleached with oxalic acid or commercial bleaches.
7. Fill nail holes, cracks or open joints with filler such as plastic wood, glue mixed with saw dusts, stick shellac or putty. The color of filling material must match the finished color of the wood to be polished.
8. Sanding the surface thoroughly using rough, medium and smooth grades respectively. Use a sand paper block for flat surfaces and large curves. Sand along the grain of the wood to avoid scratches.
9. Remove any dust from the surfaces and from the pores of the wood by brushing thoroughly.

2.1.1. Sanding processes

Sanding is an extremely important operation in the process of making any piece, in that the quality of the finish will make a great difference to the final appearance.

Sanding is carried out before finishing removing defects from the wood surface that will affect the appearance and performance of finishes that are subsequently applied to the wood. These defects include cutter marks and burns, scratches and indentations, small

Glue spots and raised grain. Sanding should not be used to eliminate larger defects such as gouges, and various forms of discoloration.



- Wood finishing starts with sanding either by **hand**, typically using a sanding block or **power sander**, scraping, or planing.
- **Hand sanding**
 - Traditional hand sanding is the simplest method there is, albeit slower and more laborious than power sanding.
 - It gives the best final finish and is the most effective way of smoothing small areas or parts with irregular high relief.
 - The choice of the correct type and grade of abrasive paper is important, as is the use of a suitable sanding block or other support so that the work is carried out correctly.
- **Power sanding**
 - One of the main advantages of power sanding is the speed with which medium and large sized surfaces can be smoothed.
 - On the other hand, a very careful professional technique is needed on the part of the operator, since any lack of concentration will cause irregular marks, such as digging in, which will ruin the finish and are hard to remove.
 - The reciprocating motion of power sanders tends to move the part being worked on.
 - The work piece should therefore be firmly fixed to a stable support, such as the workbench.



Self-Check -1

Written Test

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

1. List the procedures of surface preparation? (5)

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points
 You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____



3.1. Basic wood surface defects

Removing defects

- Sanding is very good at removing defects at wood surface.
- Larger defects that interfere with wood finishing include dent, gouges, splits and glue spots and smears.

DENTS, GOUGES, AND HOLES

No matter how careful you are, you will probably dent or gouge your wood somewhere in the preparation or assembly steps, and you may also have small holes, like finish-nail holes, that you'd like to cover up.

How to repair wood surface defects?

1. Steaming Dents

Dents are compressed wood. They often can be steamed flush, as long as the fibers have not been broken. Steaming swells the wood fibers, filling out the depression. Dents are easiest to steam flush if the surface is horizontal. Put a drop or two of water in the dent with an eyedropper or syringe. Let the water soak in a little. Add some more water, if needed to form a bead over the dent, and then touch the water with a very hot object to turn it into steam. You can use a soldering gun, the tip of an iron, or simply a pointed metal object that has been heated over a flame (wipe off any deposited soot before touching the metal to the water).

2. Wood Patches

If the gouge is large, a wood patch is best because it will be easier to disguise, and it will be permanent. A wood patch is also best for filling splits in the wood and gaps left by poorly fitted joints. A wood patch, its grain aligned with that of the surrounding wood, will shrink and expand with the surrounding wood and be less likely to crack and come out at a later date.

3. Wood Putty

It's much less work to use wood putty to fill a gouge, split, or gap than it is to insert a wood patch. Wood putty can be quite effective for filling small defects. Wood putty is simply a binder such as finish, glue, or gypsum (plaster of Paris), and some solid



material such as sawdust, whiting (calcium carbonate), or wood flour (very fine sawdust). The binder cures and holds the solid particles together to make the patch.

There are three common types of commercial wood putties-

- i. Those based on nitrocellulose lacquer,
 - ✓ Nitrocellulose-based wood putties can be thinned or cleaned up with acetone or lacquer thinner (which contains acetone).
- ii. Those based on water-based acrylic finish,
 - ✓ Water-based acrylic wood putties can be cleaned up with water until they harden.
- iii. Those based on gypsum,
 - ✓ Gypsum-based wood putties come in powder form. You mix them with water

3.2. Identifying techniques, materials & process of finishing

➤ TOOLS

There are only four tools for applying finishes: **rags, brushes, rubbing pads, and spray guns**. This minimal tool kit is a main difference between finishing and wood working. In woodworking there are countless tools, with new ones coming on the market all the time.

➤ Techniques

Finishing is very different. There aren't many tricks you can do with the four tools. The sole purpose of using one of these finishing tools, other than

- ✓ To keep your hands clean is to apply the finish so it's smooth and level.
- ✓ You could, after all, pour a finish onto the wood and spread it around with your hand.
- ✓ After the finish cured hard, you could sand it level, rub it with rubbing compounds, and achieve presentable results. But it would be much easier if you applied the finish smoothly enough in the first place for you not to have to sand at all or at least very little, to make the surface level.



Self-Check -2

Written Test

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

Part I: give short answer.

- 1. What are the tools for applying wood finishes? (4pt)

Part II: choose the best answer

- 1. _____ is the most important step of that is used to remove imperfection in surface and making smooth. (3pts)
 - A. sanding
 - B. Varnish
 - C. Remove defects
 - D. Applying
- 2. Which one of the following is not preparing surface for finishing. (3pts)
 - A. removes all excess glue
 - B. inspect the surface carefully for dent irregularity
 - C. scrap and sanding the surface thoroughly
 - D. filling the knot & small holes
 - E. none

Note: Satisfactory rating –5 points Unsatisfactory - below 5 and 6 points
You can ask your teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____



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

- stain
- Staining Procedures
- Sealing stained surface
- Applying wood filler /sanding sealer
- Oil varnishing processes

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

- Classification of stains
- Procedures in applying stains
- Sealing stained surface using brush & sponge
- List and explain types of wood Fillers
- Linseed-oil-and-varnish-based paste-wood fillers

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 5.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3, Sheet 4”and sheet 5.
4. Accomplish the “Self-check 1,Self-check t 2, Self-check 3 and Self-check 4” in page **33, 37, 39, 42and 44** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 2”in page **-45**.



1.1. Wood stain

Coloring material: - there are two kinds of coloring substance:-

- insoluble ones
- Soluble ones referred to **stains/dyes**.

Wood Stains

- ✓ Any substance which can give color to the wood is called a stain. Stain is a transparent finish. It is put on wood to produce a particular color and decorative qualities of the valuable species of wood. In addition, it is applied to improve its appearance and add color, to bring out the grain, to preserve it, and sometimes to imitate the more expensive wood. The most important quality of a stain is its color.
- ✓ Staining is a changing of hue or tone which is due to a chemical reaction or to the application of a liquid that enters to some extent into the interior and with color changes the coloring of a layer of wood near the surface while still allowing the grain with different cell arrangement to be seen clearly.

1.1. 1. Classification of stains

Based on the solvents used in making them, stains are classified into five groups. These are:

1. water stains,
2. oil stains,
3. spirit stains,
4. None-grain raising (NGR) stains, and
5. Chemical stains.

1. Water stains:

A water stain, whether pigment, dye, or both, which contains a water-based binder is called a **water stain**. These stains are composed of coloring matter soluble in water and which have a water vehicle as the principal part of the liquid. Water stains bring out the full

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beauty of the wood. It is made by mixing dry powders in hot water. Permanent acid coal-tar dyes are used almost exclusively in making water stains. They come in a variety of colors and shades. The grain of the wood should always be raised before using these types of stains.

Advantages of water stains

- It is very easy to secure darker or lighter shades and tints with water stains. For a lighter tone all that is necessary is to dilute the stains with water. For darker shades more powder or less water may be added to the stains.
- The color of water stained articles can be changed to a large extent by applying a coat of different colors over a stain that is not suitable or which doesn't match the required color.
- It possible and safe to apply water stains hot.
- The greater possible variety in colors, shade penetration and tints is obtainable in water stains since the advent of water soluble coal-tar dyes.
- Water stains penetrate much more deeply into the wood than do either oil or sprit stains.
- Water stains powders are very soluble, especially in hot water.
- The dipping process can be done safely with water stains. Whereas dipping in a sprit or oil stains is dangerous and greatly increases fire risk of a building.
- More transparent, clear effects can be secured with water stains than any other kinds with the exception of some chemical stains and possibly a few of the volatile oil stains.
- Brushes used in water stains are much more easily cleaned. While brushes used in oil or sprit stains require cleaning in turpentine or alcohol, more expensive and slower process.
- Water stains dries quickly.
- Water stains are cheaper than any kind. Because the solvent, water, costs less than turpentine or alcohol and other solvents used to dissolve oil or sprit stains.
- Water stains will usually penetrate through one coat of linseed oil, or will even darken filled surfaces to some extent.
- After they are applied and allowed to dry properly, water stains do not bleed into subsequent finishing coats.

Disadvantages of water stains

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- The use of water stains require sponging and re-sanding as a preparation in order to avoid the fuzziness that would appear on the surfaces of wood without this treatment.
- The extra expense resulting from sponging and re-sanding operations adds to the labor cost.
- Sanding can't be done over water stained surfaces without great danger of cutting through the stained layer, leaving streaks or spots of the natural color of the wood which shows in a very objectionable manner.
- The use of water in sponging and in the staining process may have a tendency to loosen glued joints.
- It is difficult to apply water stains with brushes and secure an even tone on large surfaces.
- Water stains of the most permanent character, made from coal-tar and dyes frequently have an acid reaction and therefore, should be kept in a glass or plastic containers when in a liquid form.
- Sap wood streaks are apt to take up too much stains and on some of the lighter kinds of wood, they may become darker than the heart wood.

2. Oil stains:

Any stain, whether pigment, dye, or both, that contains an oil based binder. Oil stains are easy to apply. They are available in many colors and make an excellent finish. Generally, they will not raise the fibers of the wood. There are two types of oil stains. Namely: penetrating oil stain and pigmented oil stain.

- **Penetrating oil stain:** this stain is brushed on and the excess is wiped off. A cloth pad can be used for the application. The stain should dry for 24 hours. Then it should be sealed with a thin coat of shellac or other sealer.
- **Pigmented oil stain:** this stain is applied in about the same manner as penetrating stain. For heavy "toning" effects, allow this stain to dries without wiping. It dries in about 12 hours, and usually doesn't require a shellac sealer. Carefully study the manufacturer's directions. Try the stain on scrap wood before applying it to your project. Use turpentine or turpentine substitute (mineral spirits) for a thinner.

3. **Spirit stains:** contains alcohol or acetone soluble dyes. They dry quickly and set up rapidly. Their use is generally limited to spray applications.

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4. **NGR stains:** Industry uses a stain similar to sprit stain called NGR (None-grain rising). It is fast drying like sprit stains but has a better clarity and fades resistance. It dissolves in glycol-ether solvent and often thinned with methanol. This stain is available only in liquid form and never contains a binder.

5. **Chemical stains:** Any chemicals that colors wood by reacting with chemicals naturally in the wood. Chemical staining can also called as Bleaching.

Self-Check -1	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is stain?(2pts)
2. List all types of stain?(3pts)
3. Any stain, whether pigment, dye, or both, which contains a water-based binder is called _____. (2pts)

Note: Satisfactory rating –5 points Unsatisfactory - below 5 and 6 points
 You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____



2.1. Staining Procedures

1) Procedures in applying water stains

Apply water stains by any one of several methods such as **brushing, dipping, sponging, or spraying**. Brushing and spraying methods are used most commonly.

When applying water stains with brush proceed as follow:

1. Sponge all surfaces. Allow them to dry and re-sand carefully.
2. Select a reasonably stiff brush. 5cm to 10cm wide.
3. Determine which parts should be stained first. In general, start with most not visible parts, such as the back and the inside of shelves.
4. Fill the brush well with stain.
5. Apply the stain evenly to the entire project. Put it on with long, even strokes. Do not forget to test the color of the stain on a piece of scrap wood.
6. Allow the stain to dry. Water stains air dries in 12 hours.

2) Procedures to apply oil stains

1. Decide what color stain you want/need.
2. Pour some stain into a cup or other container.
3. To test the color, brush or wipe the stain on a scrap piece of the kind of wood you will be staining. If the color is too dark, lighten it by adding turpentine or synthetic thinner.
4. Put a coat of linseed oil on all exposed end grain. This is important because end grain soaks up more stain. As a result, it will become darker than the rest of the wood. Linseed oil keeps this from happening.
5. With a cloth pad or medium size brush, apply the stain to the entire surface/project. Wipe or brush with long, even strokes.
6. Wipe off the excess stain quickly with a cloth. Let the stain dry overnight.

Staining an end grain

- The end grain of wood almost always stains noticeably darker than the face grain that has been well sanded. The reason usually given is that the end grain



absorbs more stain, but this is only one of the reasons. The other, and usually the more significant, is that the end grain has not been sanded well enough. The surface is still rough from the milling, so more stain is retained when you wipe off the excess.

- The above solution, then, for getting end grain to color more similarly to face grain is to sand better. But this is a lot of work, often too much work. There are two ways to make the end grain come out approximately the same color as the face grain. These are:
 1. Spray the stain over the entire surface and leave it-that is, do not wipe off the excess.
 2. Wash coat the end grain to seal the pores and stiffen the fibers, making them easier to sand smooth.

Reasons for staining

1. Color harmony of the woodwork with finishing of a home requires staining. For woods in its natural tones doesn't usually harmonize with textiles and wall colors.
2. Greater beauty in a particular article can often be secured by staining. This can sometimes be obtained by changing cheap wood to make it look like an expensive, beautiful one, such as imitation of wanza finish on zigba wood through staining.
3. Staining often tones down natural wood colors that are displeasing to the eye. Sometimes only part of a board needs to be changed in color. As in staining a streak or edge of sap wood to match the general color of the rest of the wood.
4. Great durability can be obtained, where wood is exposed to the weather, through preservative stains made with creosote oil. Oil stains, if they contain certain quantities of drying oils such as linseed oil, will protect or preserve wood through the varnish like film which is left as a covering after the oil has dried.
5. Sometimes staining is restored to as a means of giving new wood an aged effect (a sort of heart wood colors; darken its color).

Common staining problems

- The stain didn't give you the color implied by the name on the can.
- The stain highlighted wash board like mill marks and tear-outs that you had not noticed before.
- The color comes out differently from that of the store sample.
- The color comes out unevenly on doors, drawers, and other parts of set of cabinets.

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- The end grain becomes too dark.
- The stain comes out blotchy on the wood.
- The second coat of wiping stain didn't darken the wood.
- Drips from a dye stain showed up darker after you applied the stain to the entire area.
- The finish lifted some of the color and streaked it, or the stain bled into the finish, showing up as small spots of color over some of the pores.
- The stain didn't dry.
- The wood feels rough or fuzzy after you applied the stain.
- The stain didn't get the wood dark enough.
- The stain shows streaks through the finish.
- The stain color intensified and got darker when you applied the finish.
- The finish turned off-white when applied over the stain.
- The water-soluble dye didn't color the grain in a large-pored wood.

Self-Check -2	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are those methods to apply wood stains? 4pts
2. How to apply oil stain?3pts

Note: Satisfactory rating –5 points Unsatisfactory - below 5 and 6 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____



3.1. Sealing stained surface using brush & sponge

There is not much involved in applying stain to bare wood. You wipe, brush, or spray the stain onto the wood, or you dip the wood into the stain. Then you either wipe off all the excess stain before it dries, or leave it to dry.

You can't darken the color by applying a second coat of stain and wiping off all the excess. Since the pores or wood fibers are already filled with the first coat, you will just remove the second coat when you wipe. But you can darken the color if you don't remove the excess. If you're using a dye stain, not removing the excess is equivalent to increasing the strength of the dye that is already in the wood from the first coat. After all the solvent evaporates, it is as if you had used a stronger solution of dye in the first place. If you're using a pigment stain, not removing the excess is equivalent to applying a thinned coat of paint on top of the wood. The stain will obscure the wood slightly.

Sanding sealed surface lightly

Using Sandpaper to Cut Back the Finish

Most finishers use sandpaper to cut back the finish. It's slower than using a scraper, but it's safer. You're less likely to cut through to the wood. If you're sanding after every coat, use stearate sandpaper on the first couple of coats to reduce sandpaper clogging. If you're sanding after applying several coats, use wet/dry sandpaper and a lubricant to increase efficiency. Here are some suggestions for how to proceed:

- Begin with 220- to 320-grit sandpaper.
- To remove finish evenly on flat surfaces, back the sandpaper with a flat cork, felt, or rubber block.
- If you're using mineral spirits as a lubricant, you can add a little mineral oil to slow evaporation. Using a soap-and-water lubricant is risky because if you cut through the finish, the water will raise the grain of the wood. The damage will be difficult to repair.
- When you're satisfied with the amount of finish you've sanded off, sand with finer-grit sandpaper to remove the coarse-grit scratches



- You can continue abrading with increasingly finer grit sandpaper (up to 600-grit or finer) followed by rubbing compounds.

Self-Check -3	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

- _____The most sanding is using sand paper on the preparing surface for finishing.(2pt)
 - sanding with the grain for finishing surface
 - Sanding the End grain by the cross wise
 - sanding by make circular across the grain
 - Sanding the End grain with the grain.
 - A & B
 - C & D

Note: Satisfactory rating –2 points Unsatisfactory – below 2 points
 You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____



4.1. Applying wood filler /sanding sealer

Wood Filler

Wood filler in liquid or paste form is used to fill the pores of wood to form a smooth surface. Open grained wood, such as ash, mahogany, oak, and walnut, should be filled before they are finished.

Paste wood filler is made from silex mixed with linseed oil, japan drier, and turpentine. The filler should be colored to match the final finish.

Types of wood Filler:

- 1. Plastic wood:** Ground wood particles and plastic hardener; available in several colors.
- 2. Wood putty:** Mixed in water to dough-like consistency; contains powdered wood and adhesive.
- 3. Stick shellac:** Colored shellac applied with a heated knife; must match color of wood.
- 4. Wax stick:** soft, pigmented wax like crayon; rubbed on surface and wiped with soft cloth.

Applying paste wood filler:

Follow this procedure when applying the paste wood filler:

1. Prepare a smooth surface.
2. Clean the surface with a stiff brush, or a wet cloth.
3. Thin the paste filler with turpentine if it is too thick.
4. Apply the paste filler by brushing evenly along or across the grain.
5. When the filler begins to set, rub it with a piece of soft cloth across the grain to prevent the filler from being lifted out of the wood pores.
6. Rub again with a clean, soft cloth to remove all excess oil and filler.
7. Clean out all corners with a pointed hard wood stick.

Filling the Pores with the Finish

To fill the pores of wood with finish, you apply a number of coats of finish and cut back the coats by sanding or scraping finish off the high areas between the pores. When the finish in the pores builds to the same level as the surrounding area, no more pitting will show. It's possible to do this with any finish except wax, oil, and oil/varnish blends.



These finishes don't cure hard, so they shouldn't be built up to a thick film. Shellac, lacquer, varnish, and water base all can be used to fill the pores.

Self-Check -4	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. From the following given material which one is not used to prepare surface for finishing?
 - a. Scraper
 - B. Lacquer
 - C. Hand Plane
 - D. Chisel
 - E. Sand Paper

2. _____are the purpose of leveling the surface of wood by the filling the open to pores of the cavities in the cell.
 - A. Filler
 - B. Varnish
 - C. Scraper
 - D. stain

Note: Satisfactory rating –5 points Unsatisfactory - below 5 and 6 points
You can ask you teacher for the copy of the correct answers.

Name: _____

Date: _____



5.1. Oil varnishing processes

Linseed-oil-and-varnish-based paste-wood fillers are by far the most common. The higher the percentage of linseed oil, the more time you have to remove the excess filler. Of course, more linseed oil also means you have to wait longer before you can apply the finish.

The problem is that manufacturers seldom tell you the ratio of oil to varnish used, so you can't know in advance what the working properties of the paste-wood filler will be. You can learn only by trying different brands. If the paste-wood filler cures too fast, you can slow it by adding a very small amount of boiled linseed oil to the filler before applying it. Begin by adding no more than 1 teaspoon to 1 quart of filler. The linseed oil will keep the paste-wood filler soft and moist longer. If the paste-wood filler cures too slowly, you can shorten its curing time by adding Japan drier. Begin by adding a few drops to a quart of filler, and work up from there. It's always best, however, to find a brand of filler that gives you the working characteristics you want. Tampering with manufacturers' formulations sometimes causes curing problems.

Problems using oil/varnish-based paste-wood fillers are almost always caused by waiting too long to remove fast-curing paste-wood filler or by not giving slow-curing paste-wood filler long enough to cure before applying the finish.

-If you don't get all the excess paste-wood filler removed before it cures, you'll have cross-grain streaks that will be very difficult to remove later.

-If the paste-wood filler isn't totally cured when you apply a finish, the following **problems** could occur:

- The finish and paste-wood filler won't bond to one another.
- The filler will turn gray in the pores.
- The paste-wood filler will swell, causing it to protrude from the pores.
- The finish will develop a pronounced orange-peel texture and will cure soft.
- The only correction for any of these problems is to strip the finish and the paste-wood filler and begin all over.



Self-Check -5

Written Test

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

1. What was the Problem of using oil/varnish-based paste-wood fillers? (5pt)

Note: Satisfactory rating –3 points Unsatisfactory - below 3 and 4 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	Applying oil stain by brush
--------------------------	------------------------------------

OPERATION TITLE: To apply oil stain

PURPOSE: It is available in much color & makes on excellent finish

CONDITIONS OR SITUATIONS FOR THE OPERATIONS: The learner should perform this activity with complete protective equipment's.

EQUIPMENT TOOLS AND MATERIALS: all personal protective equipment's, oil stain, turpentine).

PROCEDURE:

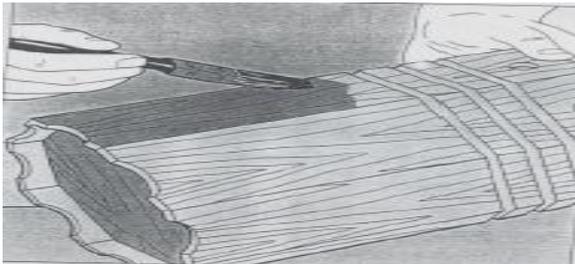
Step1. Decide what color stain you want.

Step2. Pour some stain into a cup or other container

Step3. To test the color, brush or wipe the stain on a scrap piece of the kind of wood you will be staining. If the color is too dark, lighten it by adding turpentine or synthetic thinner.

Step4. Put a coat of linseed oil on all exposed end grain this is important because end grain soak up more stain. As a result, it will become darker than the rest of the wood. Linseed oil keeps this from happening.

Step5. With a cloth pad or a medium size brush, apply the stain to the entire project. Wipe or brush with long, even strokes.



Stain can also be applied with a brush

Step6. Wipe off the extra stain quickly with a cloth.

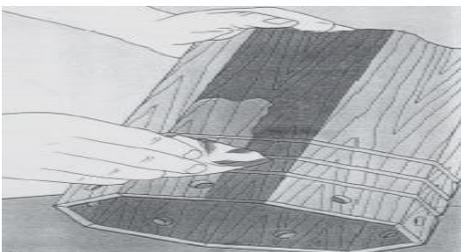


Fig. Wiping off extra stain

Step7. Let the stain dry overnight.



PRECAUTIONS: Observe safety in work place.

- *Keep your hands away from the dangerous area.*
- *Always keep the safety guard & safety cloth*
- *Make sure that the surface fine sanding*
- *Always return the paint and enamel is properly mixed with thinner*
- *Hold the brush firmly.*

QUALITY CRITERIA: Smooth sanding

- make uniform the color



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

- Precautions when applying finishing materials
- Removing surface defects & add finishing materials
- Burnishing surfaces with fine steel wool

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

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

- Applying varnish
- Applying lacquer
- Advantages and dis-advantages of varnish and lacquer
- Burnishing surfaces with fine steel wool

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 5.
3. Read the information written in the information “Sheet 1.
4. Accomplish the “Self-check 1, in **page 53**.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, and Operation Sheet 2” in **page -54 and 56** respectively.

1. Applying finishing materials

Finishing material	SOLVENT
Shellac	Alcohol
Lacquer	Lacquer thinner
Varnish	turpentine (thinner)white sprit
Penetrating Oils	Lacquer thinner or commercial Stripper.

1.1. Precautions when applying finishing materials

➤ Applying varnish

Varnish can be applied by using brush is the useful method of application for varnish, spray also can be used, usually it must be thinned with turpentine, Varnishes will be reacting with past filler, gray, but same stains will bleed through varnish, to solve this problem, and you may coat to consider using a sealer before varnishing a thin coat of shellac.

When thinning the varnish with turpentine, the amount of turpentine (thinner) must ¼ or 25%, & the varnish is ¾ or 75% in order to get proper solution.

➤ Varnishing problem

1. **Fish eye**; this problem is caused if the surface of wood has a greasy or oily substance on it this refers as crawling.
The best solution to solve this problem, keep any things that contains grease, oil.
2. **Rough texture**; this is resulted if dust is allowed to settle on the varnish before it is dry. Solution must sand after drying to top coat, also rough surface texture will result when the wood not thoroughly sanded.
3. **Runs & sags**; this is caused by applying the varnish too heavily to vertical surface. The surface tension varnish cannot hold it against the force of gravity. Runs & sags must be sanded after dried .the best solution for this problem is applying the varnish horizontally.
4. **Wrinkling**; this caused by applying too much varnish in one coat mostly if occur in corners & joints where varnish runs from two adjoining surface. To



prevent wrinkling, brush out any area that may accumulate an excess of varnish.

PRECAUTIONS: Observe safety in work place.

- *Keep your hands away from the dangerous area.*
- *Always keep the safety guard & safety cloth*
- *Make sure that the surface fine sanding*
- *properly mixed with thinner*
- *Hold the brush firmly.*

➔ **Applying Lacquer;** it is a kind of finishing material from the group of transparent finishing materials.

- lacquer is the professional first choose as a finishing coat b/se lacquer has hard a project which finished by lacquers dose not back down with age, it is resistance water, alcohol, acids, Lacquer dries rapidly & several coats can be applied in one day, the solvent lacquer will dissolve in almost any finishing .for this resin lacquer said to be <hotter > than other.

If you apply; hot finish in lacquer over a <<cold>> finish the <<hot >>finish will dissolve the project will be rained.

Advantage of lacquer;

- Highly resistance to the gasoline oil, greases, alcohol, weak acids & temperature without becoming soft & tacky.
- Quick draying (0_15)
- Easy to polish, no needed expansive equipment.

Disadvantage of lacquer

- It is difficult to apply with brush b/se it has a rapidly drying rate,
- It requires a sealing coated over (varnish)

PRECAUTIONS: Observe safety in work place.

- *Keep your hands away from the dangerous area.*
- *Always keep the safety guard & safety cloth*
- *Make sure that the surface fine sanding*

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- *Always return the paint and enamel is properly mixed with thinner*
- *Hold the brush firmly.*
- *Adequate ventilation must be used when spraying. Remember that lacquer is highly flammable. Therefore it should be stored in close containers.*

Removing surface defects & add finishing materials

Finishes deteriorate, they get damaged, and they can be repaired. Some finishes are easier to repair than others, as I've explained in previous chapters, but most damage that occurs to most finishes can be fixed. Within the furniture industry a specialty, distinct from finishing itself, is dedicated to repairing finishes. It's concentrated in furniture factories, furniture stores, and moving companies, where most damage to finishes occurs. There are four general types of damage that occur to finishes, and sometimes through the finishes into the wood beneath:

- Superficial damage to the surface of the finish in the form of light scratching, light cracking, and dullness
- Damage to the color in the finish
- Damage to the color in the wood
- damage through the finish and into the wood itself in the form of deep scratches or gouges Superficial damage to penetrating finishes (oil, oil/varnish blends, a wiping varnish applied thin) is easy to repair. More substantial damage (color problems, gouges, and deep scratches) on surfaces finished with these penetrating finishes is almost impossible to repair, because there is no film thickness to work with. Once damaged, they'll never look undamaged. All types of damage to film finishes, on the other hand, can be repaired, but concealing color problems, gouges, and deep scratches often requires a high degree of skill.

Burnishing surfaces with fine steel wool

Steel wool is used to put an even, satin scratch pattern in the finish without as much risk of corning. You can buy steel wool in natural or synthetic (compressed fiber) form, and in various degrees of coarseness. The finest steel wool is #0000. You should use this or #000 when rubbing a finish.

Choice of Lubricants

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➔ You use a lubricant with sandpaper and steel wool to reduce corning and to float away grit and abraded material, maintaining the abrasive's effectiveness. The lubricant also holds down dust and steel-wool particles so you don't breathe them. There are four types of lubricant for rubbing out:

- Mineral spirits or naphtha
- Liquid or paste wax
- Oil
- Soapy water

Self-Check -1	Written Test
----------------------	---------------------

**Direction: Much from column <A> to **

**Column<A>Column **

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Advantage of Lacquer 2. Wrinkling 3. Disadvantage of lacquer 4. The solvent of lacquer 5. Varnish | <ol style="list-style-type: none"> A. Quick Draying B. Caused by applying too much C. lacquer thinner D. difficult to apply by brush F. brush |
|--|--|

Note: Satisfactory rating –3 points Unsatisfactory - below 3 and 4 points
 You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Operation Sheet 1	Applying Varnish
--------------------------	-------------------------

PURPOSE: applying varnish is used for giving beauty & strength of the project.

CONDITIONS OR SITUATIONS FOR THE OPERATIONS: The learner should perform this activity with complete protective equipment's.

EQUIPMENT TOOLS AND MATERIALS: all personal protective equipment's, varnish, turpentine, brush)

PROCEDURE:

Step1.Check the surfaces they are free from dust.

Step2.Pour a small amount of varnish into a cup or other open container

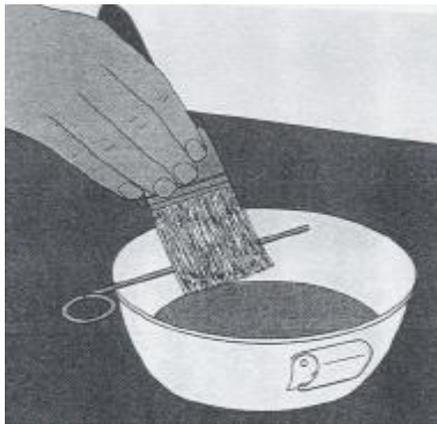


Fig 1.*Removing extra varnish by wiping the brush across the wire in the container*

Step3. Thin the first coat of varnish with turpentine or paint thinner, according to the directions on the container.

Step4.Put on the first coat of varnish with a good-grade, fine, long-bristle brush. Look at your work in good light, and brush out any runs that develop.



Fig 2.

Step5.Let the first coat dry at least 24 hours, Rub the surface lightly with very fine wet-dry sandpaper or garnet paper and water.This sanding smoothies the varnish for the next coat.

Step6.Put on more coats of UN thinned varnish as needed, Sand each coat.

Operation Sheet 2 Applying lacquer with spray gun

PURPOSE: it adds hardens of the project.

CONDITIONS OR SITUATIONS FOR THE OPERATIONS: The learner should perform this activity with complete protective equipment.

EQUIPMENT TOOLS AND MATERIALS: all personal protective equipment, varnish, turpentine)

PROCEDURE:

Step1. Pour lacquer with lacquer thinner.

Step2. Fasten the can to the spray sun. Make sure all fittings are tight. Read the manufacturer’s instructions for the spray gun you are using to learn how to adjust it

Step3. Turn on the compressor, and regulate the air pressure between 35 and 45psi (240 and 310kpa).

Step4. Pull the trigger of the spray sun, and adjust the nozzle. The mixture should come out in an even mist. Spray by moving the gun from left to right and back again in an even pattern. In vertical spraying, always move from top to bottom.



• **Fig. 3. Pouring**

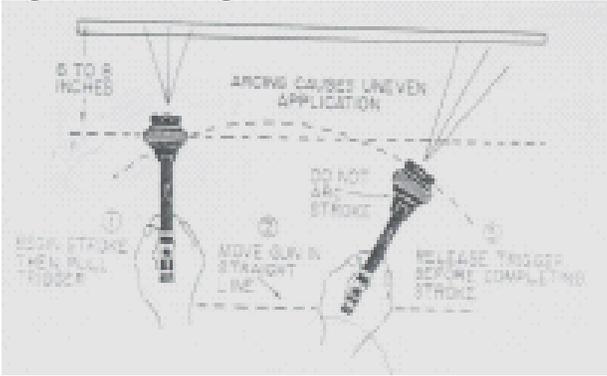


Fig. 4. The right pattern for spraying a finish

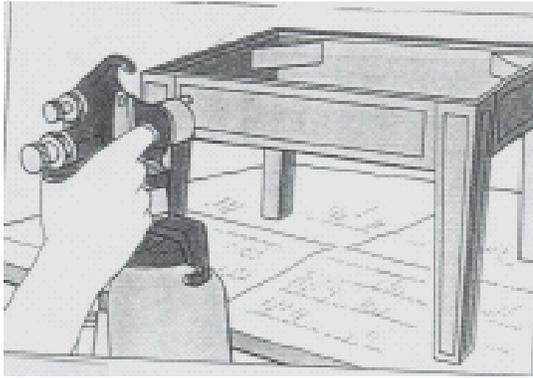


Fig.5. Spraying lacquer-base finish in a horizontal pattern

- **Note that** you turn the air cap differently for horizontal and vertical motion. This is so you can get the right spray pattern. Always keep the nozzle of the gun the same **distance** from the work. Let the finish dry at least 1 hour.
Step5. Spray lacquer thinner through the gun to clean it.
Step6. Sand the lightly with very



Fig.6. Spraying lacquer thinner through a spray gun to clean it.

- Fine sandpaper or garnet paper.
- Add an equal amount of lacquer thinner. Stir the mixture.
- Fasten the can to the spray gun. Check all connections.
- Spray one coat of lacquer of Deft brand and finish over the whole project. Do this the same.
- Way you sprayed let it dry at least 2 hours.
- Take off the spray-gun can, and pour the left-over mixture back into the original container.
- Clean the spray gun and its can by spraying lacquer thinner through.
- Sand lightly with very fine sand paper or garnet paper.
- Spray two or more coats of lacquer or Deft-brand sealer and finish over the whole project. Thin the lacquer (as in step 10) for each coat.
- Let each coat dry at least 4 hours.
- If you wish, rub the final coat with rubbing compound to a smooth finish. This rubbing is not necessary, but it will improve the final appearance of the project.
- Put on a coat of high-grade paste furniture wax. Let it dry 20 minutes. Polish with a clean cotton cloth.



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

- Clearing workplaces and unused materials
- Proper handling of tools and equipment's

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

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

- Clean the working area and unused materials
- Store tools and equipment's

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 5.
3. Read the information written in the information “Sheet 1, Sheet 2,
4. Accomplish the “Self-check 1,Self-check t 2,” in **page –62 and 65** respectively.
5. Do the “LAP test” in **page – 67** (if you are ready).



Information Sheet #1	Clearing workplaces and unused materials
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1.1. Cleaning the work area

Safe work practices should be followed at all times. A clean work area is an important part of having a safe work environment. On completion of each job the assembly area should be cleaned, this includes the removal of all waste material, the floor cleaned (swept/vacuumed) if necessary and all tools and equipment returned to their allocated storage area.

❖ **Cleaning all surfaces**

- All surfaces includes vertical surfaces such as walls and windows and horizontal surfaces such as floors,
- Door tops, window troughs, and window sills. Cleaning should proceed from Wall to floor.

❖ **Checking your work**

- Always conduct a visual inspection after any job.
- Look for any visible paint chips, dust or debris.

❖ **Clean Up Toolkit**

- The tools listed on the slide above are for cleaning interior and exterior jobs. Some tools, such as the pump
- Sprayer, shovel, and rake are used primarily for exterior clean up. Other tools, such as the buckets.
- Mops are used primarily for interior clean up.

❖ **Pick up**

- Always begin a clean-up by picking up all paint chips and any visible debris with a wet disposable cloth.

Self-Check -1	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write the proper cleaning techniques in work site?5pt

Note: Satisfactory rating - 3 and 5 points Unsatisfactory - below 3 and 5 points

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

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____



Information Sheet #2

Proper handling of tools and equipment's

1. Proper handling of tools and equipment's

On completion of each job it is important that all the equipment you have used be cleaned and checked for serviceability before being stored. Equipment that is faulty or damaged should be tagged and reported to supervisor or appropriate person. A suitable logging system should be used to identify.

Equipment or materials that need to be serviced, repaired, removed, replaced or considered unsafe.

1.1. Storing tools and equipment

- ✓ Tools and equipment should be safely stored according to workplace procedures. Generally, this will mean returning items to their allocated place.
- ✓ This could include shadow boards, cabinets, cupboards, power tool cases, cutter blocks, drill bit containers, benches or storage racks.
- ✓ Tools and equipment must be put away so that they can be easily located and accessed.



Self-Check -2	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. How to store tools and equipment? 3pt

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points
 You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____



LAP Test	Practical Demonstration
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Name _____ date _____

Time starting _____ Time finishing _____

Instruction: you are required to perform the following tasks within 2days.

Task 1: Working project: - coffee table practically

Task 2: Apply finishing materials on your project