Furniture Making -Level-III

Based on Sep, 2012 Version 5 Occupational Standards and Dec, 2020 V1 Curriculum

Module Title: Apply Decorative Finishing

LG Code: IND-FMK3 M08 LO(1-4)-LG-(29,30,31,32)

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December 2020

Bishoftu, Ethiopia

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INSTRUCTION SHEET

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

- Applying work instructions
- Following Safety requirements in accordance with safety plans and policies
- Selecting & checking tools & equipment to carry out tasks for serviceability
- Quality requirements and safe work methods
- Identifying environmental protection requirements
- Furniture decorative finishing techniques
- Preparing decorative finishing work

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 work instructions
- Follow Safety requirements in accordance with safety plans and policies
- Select & check tools & equipment to carry out tasks for serviceability
- Quality requirements and safe work methods
- Identify environmental protection requirements
- Furniture decorative finishing techniques
- Prepare decorative finishing work

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets

Information Sheet 1. applying work instructions

1.1 Applying work instructions,

Introduction

.**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.

purpose of a work instruction

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.

Planning is the systematic process of establishing a need and then working out the best way to meet the need, within a strategic framework that enables you to identify priorities and determines your operational principles.

Planning means thinking about the future so that you can do something about it now.

The Planning Process: Five Essential Steps

.Step 1 - Establish Your Objectives. To navigate the road to retirement, you must first map out your destination.

Step 2 - Determine Your Investment Style.
Step 3 - Evaluate Investments.
Step 4 - Choose an Appropriate Investment Plan.
Step 5 - Execute and Periodically Examine the Plan.

The six steps 6 steps in the planning process

Step 1 - Identifying problems and opportunities.
Step 2 - Inventorying and forecasting conditions.
Step 3 - Formulating alternative plans.
Step 4 - Evaluating alternative plans.
Step 5 - Comparing alternative plans.
Step 6 - Selecting a plan.

A **specification** often refers to a set of documented requirements to be satisfied by a material, design, product, or service. A specification is often a type of technical standard. The word **specification** is broadly defined as "to state explicitly or in detail" or "to be specific".

Four Types of "Specifications"

. **Product Specification**: This describes a manufacturer's product and its performance without consideration for a particular building.

. **Project Specification**: This describes an architect's design and performance requirements for a particular building.

. **Master Specification**.

. **Guide Specification**.

importance of specification

Let's look at the main reasons why the specification is so important to the construction process: It provides clear instructions on the intent, performance and construction of the project. It can reference the quality and standards which should be applied. Materials and manufacturers' products can be clearly defined.

Quality requirements are specifications of the quality of products, services, processes or environments. Quality is any element, tangible.

quality requirement refers to a condition or a capability that must be present in a requirement. They represent that which is needed to validate the successful completion of a project deliverable. ... This implied **quality requirement**, now being verifiable, should be captured.

Good requirements should have the following characteristics:

- ✓ Unambiguous.
- ✓ Testable (verifiable)
- ✓ Clear (concise, terse, simple, precise)
- ✓ Correct.
- ✓ Understandable.
- ✓ Feasible (realistic, possible)
- ✓ Independent.
- ✓ Atomic.

Operational Details

Collective operation is executed by having all processes in the group call the communication routine, with matching arguments.

An **example** of **operational definition** of the term weight of an object, operational zed to a degree, would be the following: "weight is the numbers that appear when that object is placed on a weighing scale".

Operational experience is a key stepping stone on the way to the top position in any organization. Manufacturing, purchasing, supply chain management, distribution and call

centre **operations** are all examples of **operational** roles (also often referred to as line roles or front-line roles), and there are many more.

Self-Check1	Written Test

Directions: Fill the blank space. Use the Answer sheet provided in the next page:

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.

2._____ is the systematic process of establishing a need and then working out the best way to meet the need, within a strategic framework that enables you to identify priorities and determines your operational principles.

3. _____ are specifications of the quality of products, services, processes or environments. Quality is any element, tangible

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score =

Information Sheet 1.2 Following Safety requirements in accordance with safety plans and policies

1.2Following Safety requirements in accordance with safety plans and policies

Safety (OH&S) • OH&S requirements are to be in accordance with legislation/regulations/codes of practice, organizational safety policies and procedures and project safety plan. This may include protective clothing and equipment, use of tools and equipment, workplace environment and safety, handling of materials, use of firefighting equipment, organizational first aid, hazard control and hazardous materials and substances • Personal protective equipment is to include that prescribed under legislation/regulation/codes of practice and workplace policies and practices • Safe operating procedures are to include but not be limited to the conduct of operational risk assessment and treatments associated with solvents, lead, chemicals, fumes/gases, confined work areas, manual handling, falling objects, electrical and fire and/or explosion from combustible materials, traffic control, working at heights, working in proximity to others, worksite visitors and the public • Emergency procedures related to operations are to include but may not be limited to extinguishing fires, organizational first aid requirements and evacuation.

SANITATION

Wood is a porous material. It contains countless holes of various sizes. These holes can accumulate dirt and grime from handling, atmospheric contaminants, and food. Grimy wood is unattractive, and it can be a health hazard, providing a breeding place for bacteria. A finish seals the porous surface, making it less susceptible to soiling and easier to clean

Responsibilities

Environmental Health and Safety (EH&S) EH&S will establish and post safety plan pertaining to the use of shops. Questions concerning plan exceptions or clarifications must be directed to EH&S for review and comment before initiating at the shop level. EH&S will periodically conduct safety audits of all student used shops.

EH&S has final authority over all safety issues and may immediately halt any operations or procedures it considers unsafe at any time at its discretion. Principal Investigators (PI), Instructors and Shop Supervisors The PI and shop supervisors are responsible for enforcing the provisions of this plan including the provision of required training and personal protective

equipment for students using shop equipment. Shop supervisors must keep required machine guards in place and remove damaged equipment from service.

Shop supervisors have the authority to halt unsafe operations at any time and to restrict access to a shop to any student violating the provisions of this plan. Shop supervisors are responsible for providing required personal protective equipment (PPE) and enforcing its correct use.

Any student using a Pace University shop is expected to follow all safety requirements as presented in this plan and as posted within each individual shop. All students must receive required training prior to working with any power tools, woodworking equipment or other shop related equipment. All students must properly use any required personal protective equipment while working in a shop. All students must abide by any individual shop restrictions (i.e. hours of operation) and must only work in a shop when the supervisor is present. Any injury as well as any unsafe conditions, actions or near-miss incidents must be reported to the shop supervisor.

Training Requirements

Training must be provided before a student is allowed to work in a shop. General shop safety requirements and machine specific training is required to be provided by the shop supervisor to anyone using a student machine shop.

Required training must include the following elements:

- Information on the hazards associated with a particular machine or piece of equipment, including a knowledge base of how a piece of machinery functions so the user can anticipate risks and hazards while working.
- The necessary safety precautions that must be followed when working with a particular machine or piece of equipment including the purpose and function of any guards that are in Tools and Equipments requirements

Self-Check 2	Written Test

Directions: Write the answer this question . Use the Answer sheet provided in the next page

1.what safety?(2)point

_____

_____

2.Write at list five (5)safety tools?

a._____

b._____

c._____

d._____

e._____

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

Information Sheet 1.3 Selecting & checking tools & equipment to carry out tasks for serviceability

3.1 finishing tools

a turning-**tool** with a cutting edge ground to a large angle. Such tools remove a very thin chip, and are often used simply as scrapers. noun In glass manufacturing, an instrument, resembling a pair of forceps, used to shape the necks of bottles, lamp-chimneys, etc.

Fig.3.1

Equipment/materials needed

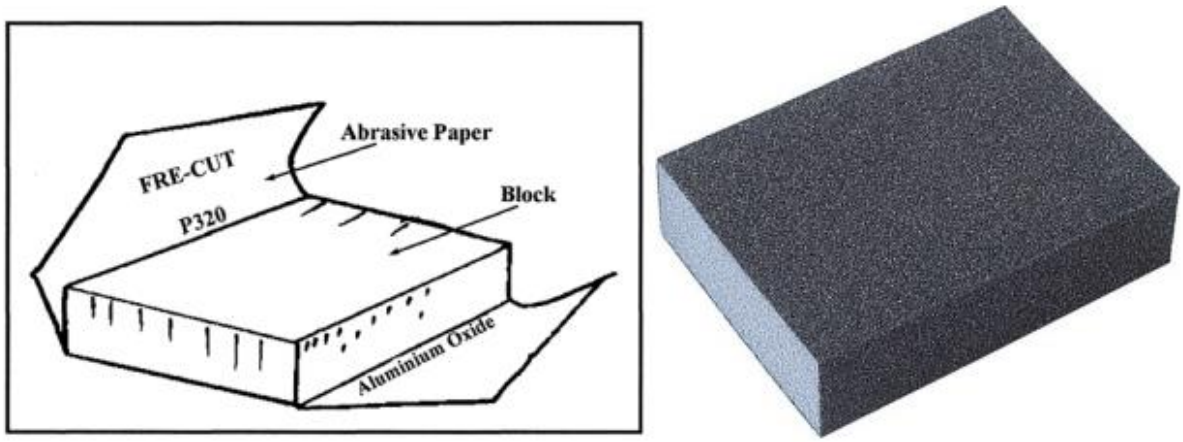
Abrasive Papers

You will need two types of abrasive papers:

- Free cut 280 - 360 Grade.
- Wet and Dry 240 - 400 Grade.

Normally used on previously painted surfaces. It can be used dry or dampened with water, but it fills up quicker if used dry.

You may need sanding blocks.



Sanding blocks

Fig.3.2

Powered Sanding Tools

The most commonly used power sander is the orbital sander.

These tools, though fast, have their limitations, and special care must be taken, to ensure that the surface of the work being sanded is not accidentally damaged.

It is preferable to prepare the surface of a small project by hand.

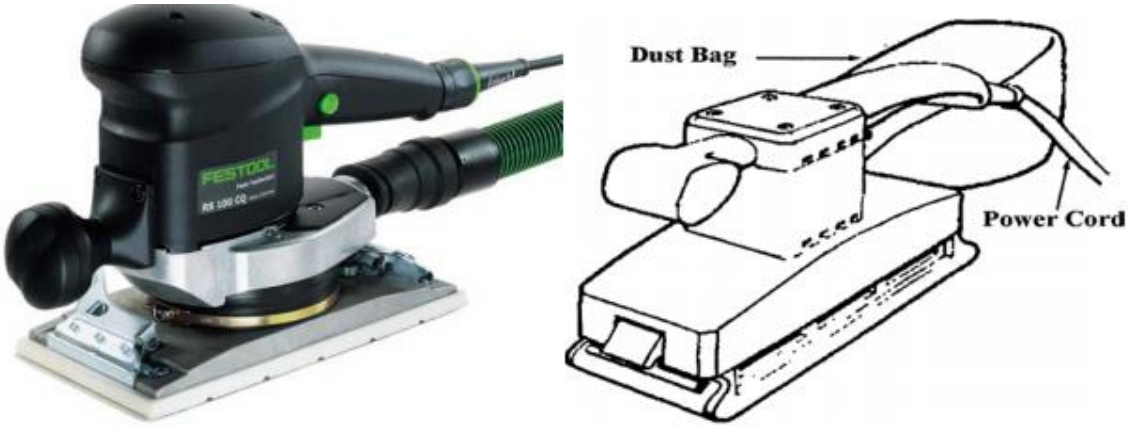


Fig.3.3

Orbital sanders

If a power sander is used to strip-off a thickly painted surface the abrasive paper will tend to clog due to melted paint caused by friction.

Fillers are used to fill and level any cracks or holes that may be in the surface.

Three types of fillers are:

(i) PVA Putty (acrylic emulsions) water based.
(ii) (ii) Epoxy based fillers (solvent based) linseed oil, turpentine.
(iii) (iii) All purpose pastes (ready mixed).

Types of fillers also include automotive spray fillers and self prepared fillers, but the most common and easy to use is a manufactured, ready mixed type.

Use a fine surface filler that provides good sanding qualities. If you use a selfprepared filler, the filler powder will need to be mixed with thinners to a stiff paste or workable consistency.

Generally, fillers are available either as ready mixed pastes or as powders that are mixed with water. Setting times are given as a guide, but should apply to average conditions. In cold weather, setting may take longer, but in hot conditions, it will be faster.

For mixing, you will need a clean, plastic container or tray and access to water.

To apply a filler, a variety of tools as shown below may be used.

Fig.1.4

Rollers For paint application in this module, two types of roller are suitable.

Natural fibers, for example wool coatings; or §

Synthetic, for example, acrylic, polyester and nylon

Sizes vary from 200mm to 270mm. The manufacturer's information will give you a recommendation chart.

Spray Guns

High Pressure spray painting gives an excellent finish, but requires more skill by the user. A spray unit consists of a spray gun, hose and compressor. This method of application is faster, but requires extra preparation, such as masking of surrounding areas to avoid over spraying. Spraying in some areas is not practical.

When spraying, the correct protective equipment must be worn, covering the body as much as possible. A respirator with the correct filters is essential. Provide adequate ventilation during use, and do not use the equipment near any sources of ignition

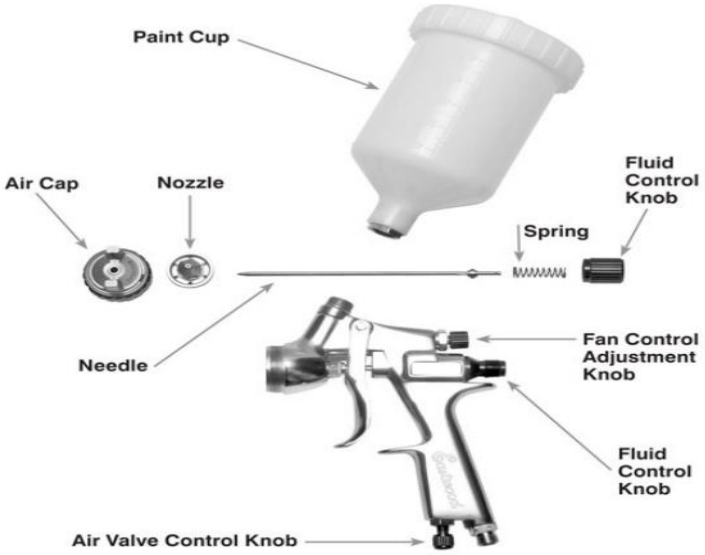


Fig.1.5

SPRAY GUNS AND EQUIPMENT '

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. The trick to achieving proper atomization is getting the right amount of air striking the fluid as it comes out of the tip of the gun. If you have too little air, the atomization won't be great enough, and the finish won't flow together. It will cure looking like the surface of an orange; the effect is called orange peel If you have too much air, the finish will dry before it hits the wood, producing a dusty look. This is called dry spray. (See "Common Spraying Problems") The two air jets that direct the atomizing air have an additional function. Because they are placed 180 degrees apart, in the horns of the air nozzle, they force the atomized air into an oval-shaped pattern called a fan. The fan is perpendicular to the line of the horns. By increasing the air flow through these jets, you widen the fan, so you can coat a wider area with each pass. By decreasing the airflow, you shrink the fan to a very small circular pattern, which you can use to fill in small defects (Figure 3-2). By rotating the

air nozzle, you can change the angle of the fan relative to the gun. Most spray guns have two control knobs on the back side of the gun (Figure 3-3). The lower knob sets the amount you can depress the trigger, and therefore how much finish will be discharged. The upper knob controls the amount of air discharged, and therefore the amount of atomization and the width of the fan. Some spray guns have only the knob that controls the trigger and finish discharge. The airflow is constant. These spray guns usually let you control the fan pattern by turning the air nozzle.

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 to10 psi. These guns create much less overspray.

This means that well over half of the material you're spraying is wasted: It goes into the air. (Some of this overspray settles back onto the finished surface, making it feel dusty or sandy.) This waste was tolerated until recently, when many states and localities began passing laws aimed at reducing the release of pollutants into the atmosphere.

Cleaning and Storing Spray Guns Cleaning your spray gun thoroughly is very important. If you leave finish to harden in the gun, the gun will become unusable, and it may be very difficult to get it clean again. Follow these steps:

1. Spray solvent through the gun after each day of use, or anytime you won't be using the gun for several hours. This is especially critical with water base and varnish, which are difficult to remove once cured. The best solvent to use for all finishes is lacquer thinner.

2. Remove the air nozzle and needle-valve stem after each day of use. Store them in lacquer thinner solvent, or clean them and put them back in the gun.

3. Some finishers also like to remove the fluid nozzle and clean it. This step is especially important when you finish a project and won't be using your gun for a while.

4. If you're using a cup with the spray gun, clean the cup thoroughly, including the gasket. Be sure to keep the air inlet hole at the top of the cup clean and open at all times. The spray gun will sputter if this hole gets clogged with finish. If you're spraying finish through a pressure pot, clean it and the hose thoroughly

Self-Check 3	Written Test

Directions: Short answer . Use the Answer sheet provided in the next page

1. What are two types of abrasive papers ?
2. what are three types of fillers are?

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

Information Sheet 1.4 Quality requirements and safe work methods

1.4 Quality requirements and safe work methods

After removing most of the finish with water alone, wash the brush again in soap and water. If you're using any other type of finish, follow these steps

Wash the brush in the proper solvent or thinner. Sometimes you can wash the brush successfully by squeezing it against the bottom of a container that has an inch or two of solvent or thinner in it. But you may have to swish the solvent or thinner through the bristles with your fingers to get the finish loose near the ferrule. Wear gloves when doing this

Repeat Step I in clean solvent or thinner until the brush is almost clean.

Wash again, this time in lacquer thinner. Lacquer thinner will remove the oiliness left by mineral spirits thinner, and it will remove any remaining finish.

After each cleaning, remove the excess solvent or thinner by shaking the brush or holding it between the palms of both hands and twirling it inside an empty finish can.

Wash the brush in soap and water, running your fingers through the bristles to be sure there isn't any remaining finish stuck to them. (This step is optional. Many finishers don't like to put water on their brushes. Personally, I don't see that it does any harm, and it does clean the brush better.)

If the bristles aren't straight, comb them out with a brush comb, available at paint stores. (A fork will also work.)

If you use the brush solely for oil or varnish finishes, rub a couple of drops of a light oil, such as mineral oil, onto the bristles. The oil will help keep the bristles soft, but it will interfere with all other finishes, so don't apply oil to general-purpose brushes

Wrap the brush in heavy, absorbent paper such as construction paper, a brown paper bag, or heavy paper towels. Hold the paper in place with a rubber band or masking tape . This step is very important for keeping the bristles straight and clean as they dry out

. Store the brush flat in a drawer or hang it from a hook. Keeping brushes in good shape is more mental than physical (it takes only 5 or 10 minutes). Make cleaning your brush a part of your routine. You will feel so much better the next time you use the brush if it is soft and springy instead of stiff and difficult to work. If you keep a brush clean and the bristles straight, it will provide good service for years. Only when the flagged bristles

wear off will you have to buy a new brush. Use your worn brushes for less exacting tasks, such as applying stripper.

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.

SPRAY GUNS AND EQUIPMENT ' 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. The trick to achieving proper atomization is getting the right amount of air striking the fluid as it comes out of the tip of the gun. If you have too little air, the atomization won't be great enough, and the finish won't flow together. It will cure looking like the surface of an orange; the effect is called orange peel If you have too much air, the finish will dry before it hits the wood, producing a dusty look. This is called dry spray. (See "Common Spraying Problems") The two air jets that direct the atomizing air have an additional function. Because they are placed 180 degrees apart, in the horns of the air nozzle, they force the atomized air into an oval-shaped pattern called a fan. The fan is perpendicular to the line of the horns. By increasing the air flow through these jets, you widen the fan, so you can coat a wider area with each pass. By decreasing the airflow, you shrink the fan to a very small circular pattern, which you can use to fill in small defects (Figure 3-2). By rotating the air nozzle, you can change the angle of the fan relative to the gun. Most spray guns have two control knobs on the back side of the gun (Figure 3-3). The lower knob sets the amount you can depress the trigger, and therefore how much finish will be discharged. The upper knob controls the amount of air discharged, and therefore the amount of atomization and the width of the fan. Some spray guns have only the knob that controls the trigger and finish discharge. The airflow is constant. These spray guns usually let you control the fan pattern by turning the air nozzle.

Self-Check 4	Written Test

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

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1 , what is the list five common film finishes used in woodworking ("What's in a Name?") 5point

2 what is the procedure steps finish After removing most of the finish with water alone, wash the brush again in soap and water. If you're using ? 4points

3 define Obtaining ,confirming & applying work instructions?4 points

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

Information Sheet 1.5 Identifying environmental protection requirements

1.5 Identifying environmental protection requirements

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 to10 psi. These guns create much less overspray.

This means that well over half of the material you're spraying is wasted: It goes into the air. (Some of this overspray settles back onto the finished surface, making it feel dusty or sandy.) This waste was tolerated until recently, when many states and localities began passing laws aimed at reducing the release of pollutants into the atmosphere.

Cleaning and Storing Spray Guns Cleaning your spray gun thoroughly is very important. If you leave finish to harden in the gun, the gun will become unusable, and it may be very difficult to get it clean again. Follow these steps:

1. Spray solvent through the gun after each day of use, or anytime you won't be using the gun for several hours. This is especially critical with water base and varnish, which are difficult to remove once cured. The best solvent to use for all finishes is lacquer thinner
2. Remove the air nozzle and needle-valve stem after each day of use. Store them in lacquer thinner solvent, or clean them and put them back in the gun.
3. Some finishers also like to remove the fluid nozzle and clean it. This step is especially important when you finish a project and won't be using your gun for a while.
4. If you're using a cup with the spray gun, clean the cup thoroughly, including the gasket. Be sure to keep the air inlet hole at the top of the cup clean and open at all times. The spray gun will sputter if this hole gets clogged with finish. If you're spraying finish through a pressure pot, clean it and the hose thoroughly.

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Self-Check 5	Written Test

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

1 Identifying environmental protection requirements ?5point

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

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

Information Sheet 1.6 Furniture decorative finishing techniques

1.6. Furniture decorative finishing techniques

Techniques of Decorating Wood Finishing

- **Staining**:-is used to enhance the true color of wood.
- **Glazing and Toning**:- are used to a high light the details in the wood or unify and add depth to the color.
- **Bleaching**:-is used to lighten the natural color of wood.
- **Distressing**:-used to give age and interest to the finish.

Coloring Substances

Coloring substances are any substances which can gives color to the wood.

They are two types. Namely;

- ✓ insoluble one called pigments and
- ✓ soluble ones referred to as stains or dyes.

Pigments: until recently, all pigments was finely ground colored earth, mined in various parts of Europe and America. Now, most pigments are colored synthetic particles that resemble earth. Because pigment is opaque, it is used as the colorant in paint. When you pile enough pigment particles on top of each other, you can no longer see through to the wood-because pigment is heavier than the liquid it is suspended in, pigment particles settle to the bottom of the container and have to be stirred back into suspension before use. Most commercially available stains contain pigment.

When the excess is wiped off, pigment colors wood by lodging in depressions, such as pores, scratches, and gouges. The larger the cavity, the more pigment lodges, and the darker and more opaque the cavity becomes. This is why pigment stains accentuate large pores, gouges, and cross-grain sanding scratches. Pigment lodged in sanding scratches that run in the direction of the grain is usually difficult to distinguish from the grain itself, which is why you should always sand with the grain. Pigment can also color wood by building to a thickness on the surface. Building occurs when you don't wipe off all the excess stain, and it is equivalent to painting the wood with a thinned paint. You can control how much

you obscure the wood by how much pigment you leave on the surface. Not removing all the excess pigment stain can produce a more even coloring, similar to paint, but the wood is muddied.

Dye: is a chemical that dissolves in a liquid. All the color that remains in the liquid after the pigment has settled is dye. (Dye settles only if there is not enough liquid to pull all the dye into solution). Dye is a colorant found in such common substances as coffee, tea, berries, and walnut husks. These and other natural materials, such as log-wood, alkanet root, cochineal, and dragon's blood were once used to color wood. Now, far superior synthetic aniline dyes are available. These dyes are derived from petroleum (they were originally derived from coal-tar), and they were developed, beginning in the late nineteenth century, for use in the textile industry. Unlike natural dyes, aniline dyes are available in an infinite range of colors and are considerably more resistant to fading. In the textile industry, aniline dyes are classified by chemical type or by how they are applied. Wood finish suppliers classify dyes by the solvent in which they dissolve best.

Self-Check 6	Written Test

Directions: write short answer . Use the Answer sheet provided in the next page

1._____ is a chemical that dissolves in a liquid. All the color that remains in the liquid after the pigment has settled is dye.

2. _____used to give age and interest to the finish

3. _____is used to enhance the true color of wood.

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

1.7 Preparing decorative finishing work

TYPES OF "OIL"

Much of the confusion about oil is generated by the marketplace, which offers four significantly different finishes, all called oil: • Straight oil, of which there are two principal kinds-tung oil and linseed oil. Tung oil is usually sold as "pure" or "100 percent" Tung oil or "China wood oil." Linseed oil comes in two forms, raw and boiled. • Polymerized oil, of which there are two principal kinds-polymerized tung oil and polymerized linseed oil. Polymerized oils perform more like varnish than like straight oil. They are expensive and not widely available. • Regular varnish (including polyurethane) that has been thinned with two to three parts mineral spirits to one part varnish. This finish is often sold as oil but is actually a wiping varnish. • A blend of straight oil and varnish (including polyurethane). This oil/varnish mixture is often sold as Danish oil. These "oil" finishes look different: They range from glossy to flat, and from very thin on the wood to quite thick. They perform differently: Some are very effective barriers against scratches, stains, water, and water-vapor exchange, while others aren't. And they can be applied differently: Some can be left wet on the wood, others have to be wiped almost dry.

Straight Oil Oil is a natural substance that is extracted from plants, nuts, fish, and petroleum. Some oils, such as linseed oil and tung oil, cure- they change from a liquid to a solid by absorbing oxygen from the air. Linseed oil absorbs so much oxygen when it cures that its weight increases as much as 12 percent. Oils that cure can be used as finishes. Other oils, such as mineral oil, olive oil, and motor oil, don't absorb oxygen and therefore don't cure. Because they don't solidify, they are ineffective as finishes. Still other oils, such as walnut oil, soybean oil, and safflower

oil, are semi-curing: They cure very slowly and never very hard. They are only marginally effective as finishes. (See "Safety and Oil Finishes") Straight oils used as finishes have certain characteristics in common. They cure slowly compared to every other finish, and they cure to a satin (not glossy) sheen after you apply several coats. They also cure soft. This makes them impractical for use as finishes unless you wipe off the excess after each application. Straight-oil finishes are true penetrating finishes. You can't build a thick, hard, protective film on the surface of the wood the way you can with

film finishes. If you have some cured overspill around the top of a can of linseed oil or tung oil, push your fingernail into it and notice how soft it is compared to other finishes.

Linseed oil is extracted from seeds of the flax plant. This oil, in its raw state, is an inefficient finish because it takes many days to cure. So, to make it more effective, metallic driers are added. These driers are usually salts of cobalt, manganese, or zinc. They act as catalysts to speed the curing. (Lead was once used as a drier but is no longer, because it is a health hazard.) With driers added, linseed oil cures in about a day and is called "boiled" linseed oil. Unless you want an oil that cures very slowly, there's no reason to use raw linseed oil. Of all finishes except wax, linseed oil is the least protective. (See "Using Wax as a Finish") It's a soft, thin finish, so it provides no significant barrier against scratching. It's also easily penetrated by water and water vapor. Liquid water will work through a linseed oil finish and cause a smudge within 5 to 10 seconds (Photo 4-3). Water vapor will pass through a linseed oil finish almost as if it weren't there. You may find it interesting that old paints based on linseed oil performed well precisely because water vapor could pass through so easily. These paints allowed moisture to escape through the walls of houses without blistering the paint film. Modern alkyd-based paints blister easily because they form a much better barrier to water-vapor exchange. This is why water-based, latex paint is recommended for use on the outsides of houses. Like linseed oil-based paint, latex paint "breathes."

Tung oil is extracted from nuts of the tung tree, which is native to China. Tung oil has been used for centuries in China, but it was not introduced into the West until the very end of the nineteenth century. It is now cultivated in South America. Though tung oil is more expensive than linseed oil, tung oil has established a firm position in the paint and coatings industry because it is one of the most water-resistant oils. Many high-quality varnishes are made with tung oil. But, contrary to what you might think, tung oil is seldom used as a finish in its own right. Tung oil can be made fairly water-resistant after five or six coats. But it is too soft and thin to resist scratching or water-vapor exchange, and it is difficult to make the finish look nice. The first three or four coats appear flat and splotchy on the wood and feel rough to the touch. Only after five or six coats, sanding between each coat, can you get an even, satin sheen. But the finish is still not as smooth to the touch as linseed oil. In addition, tung oil cures very slowly, and it turns white if left to cure in any thickness. The curing is faster than raw linseed oil but slower than boiled linseed oil, so you need to wait several days between coats. This makes tung oil an inefficient finish to use. The white color can cause problems in large pores

and cracks in the wood. There is no way to remove the white color if it occurs, short of stripping the wood and starting all over. About the only advantage tung oil has over linseed oil, other than better water resistance after five or six coats, is that tung oil yellows less than linseed oil. This can be important on blonde woods that you don't want to darken too much.

Polymerized Oil Any curing or semi-curing oil can be heated in an oxygen-free environment to around 500 degrees Fahrenheit to increase its gloss and hardness and reduce its curing time. Oil processed in this manner is called polymerized or heat-bodied oil. Polymerized oil is commmonly used in ink and outdoor paint.

Polymerized oil is sometimes used as a finish by itself. It cures very fast and very hard and resists water and water-vapor penetration. Many gun owners like the results they get when they rub this oil (usually sold by other names, such as Tru-Oil) onto their gun stocks. Because the oil is hard when cured, its possible to build a film from many thin coats. There are two problems with using polymerized oil as a finish on large surfaces such as furniture: It's expensive, and it cures too fast to be applied and wiped off unless it has been thinned a lot with mineral spirits. (You can't apply polymerized oil in thick layers as you can varnish, or tiny cracks will develop in the cured film.) Besides, there's no evidence that polymerized oil protects significantly better than varnish. For these reasons polymerized oil is not widely used as a furniture finish.

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Self-Check 7	Written Test

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

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1 define Obtaining ,confirming & applying work instructions?4 points

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

L G#- 30	**LO #2. LAY-OUT AND PREPARE MATERIALS**

Instruction sheet

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

- Selecting & checking materials for flaws following work instructions
- Carrying out of decorative finishes to furniture
- Types, characteristics, uses & limitations of decorative surfaces
- Laying out materials based on specification
- Selecting suitable joining points based on the design
- Preparing materials for cutting in line with work requirement

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 & check materials for flaws following work instructions
- Carry out of decorative finishes to furniture
- Types, characteristics, uses & limitations of decorative surfaces
- Lay out materials based on specification
- Select suitable joining points based on the design
- Prepare materials for cutting in line with work requirement

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets

Information Sheet 2.1Selecting & checking materials for flaws following work instructions

2.1 Selecting & checking materials for flaws following work instructions

Laying-out procedures based on specifications The difference between a quality finish and one that is nothing special has less to do with how you apply the finish than with what you do afterwards-with how you finish the finish. To finish a finish, you rub it with abrasives, such as sandpaper, steel wool, rubbing compounds, or a combination of these, sometimes using a lubricant such as wax, mineral spirits, oil, or soapy water. The idea is the same as sanding wood.

You smooth and level the surface, putting finer and finer scratches into it until you are happy with the way it feels and looks. (Don't confuse a hand-rubbed finish using abrasives with a hand rubbed finish that refers to "rubbing in" an oil finish-see "Oil Finishes and Penetration".) Rubbing a finish does two things: It makes the finish feel smoother, and it gives the finish a softer appearance. Both are difficult to describe and virtually impossible to capture in a photograph. Whenever you apply several coats of a film finish (a finish that you build to a thickness on the wood), you will always get some roughness caused by embedded dust. You will also get a harsh-looking shine when you view the surface in reflected light, and you will be able to see brush marks or orange peel, depending on whether the finish was brushed or sprayed. No matter how careful you are, you can't apply a perfect finish. Rubbing a finish cuts off (or at least rounds over) dust nibs, softens the harsh reflected shine, and removes (or at least disguises) brush marks and orange peel. Rubbing does all this by putting fine scratches in the surface. The scratches become what you feel and see, thus replacing the problems. By making the scratches too fine to feel, you make the surface feel smooth. You control the amount of shine by how fine you make the scratches. The finer the scratches the higher the gloss. The coarser the scratches the lower the gloss. (For example, a diamond is polished to a high gloss with very fine abrasive rubbing compounds.) The word for degree of gloss is sheen. A high sheen is a high gloss. A low sheen is a satin or flat finish . Many woodworkers avoid rubbing out a finish because they don't understand it, or they consider it too complicated. This is usually a mistake. There's not much to understand, and the complication is only in the number of ways to do it. If you've never rubbed out a finish before, I suggest you begin simply by rubbing with steel wool. You will smooth and disguise flaws in your finish and produce a satin sheen. Next, try sanding a finish level before rubbing.

Self-Check 1	Written Test

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

1. When Selecting & checking materials for flaws following work instructions ?5point

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

Information Sheet 2.2 Carrying out of decorative finishes to furniture

2.1 Carrying out of decorative finishes to furniture

factors in rubbing a finish

The results you get rubbing a finish are influenced by a number of factors:

- the type of finish you are rubbing
- how thoroughly the finish has cured
- the type of rubbing abrasives you use
- the type of rubbing lubricants you use
- the rubbing schedule
- the cleanup
- the final waxing or polishing

Type of Finish

Hard, brittle finishes are easier than tough finishes to rub to a smooth, even sheen because hard finishes yield a clean, sharp scratch pattern when rubbed. Tough finishes are difficult to scratch, and the scratches you do make are uneven tears rather than smooth, clean cuts. Shellac and lacquer are the best rubbing finishes. Varnish (including polyurethane), conversion and water base are the most difficult finishes to rub to an even sheen. You can still rub these finishes, but the results won't be as nice. Keep in mind, however, that there are variations within each of these types of finishes depending on how the particular finish is made. It's possible, for example, to make a water-based finish with good rubbing qualities and a lacquer with poor rubbing qualities. The harder, more brittle the finish, the easier it will scratch, but also the sooner it will crack. Many of the varnishes used on furniture made around 1900 severely cracked after a short time, because manufacturers went too far in trying to get good rubbing qualities. Many film finishes are sold as semi-gloss, satin (eggshell), or flat because they contain flatting agents (see Figure 7-2). These finishes can be rubbed just as easily as gloss finishes, but the effect will be different. Gloss finishes have more clarity, so the wood will appear deeper. You can make satin and flat finishes appear shiny when viewed in reflected light,

but they will be cloudy when you look straight into them. You can take advantage of this effect to imitate the appearance of an old finish that has been well maintained but has clouded with age.

Thoroughness of Curing A finish begins as a liquid and becomes a solid when it cures. Between these extremes, it goes through various stages of hardness. If you try to abrade a finish before it has adequately cured, the scratch pattern will be uneven, and the scratches you make may disappear in places as the finish continues to cure. This will result in a splotchy and uneven sheen. In addition, since finishes shrink as they cure, pores that you have filled may open, leaving a pitted surface again. There are no absolute rules for how long you should let a finish cure before you rub it. A good rule of thumb is to wait a month. Longer is even better. Unfortunately, most finishers rush this operation, rubbing out the finish within a few days of application, which impairs the results. See

Choice of Abrasives there are three types of abrasives for rubbing finishes:

- Sand paper
- Steel wool (including synthetic steel wool, also known as 3M Scotch-Brite)
- rubbing compounds

Sandpaper is used to cut back the surface, eliminating irregularities such as orange peel, brush marks, and dust nibs. You can back the sandpaper with your hand or with a flat rubber, cork, or felt block. Using a block will produce a more level surface. Silicon-carbide paper is best for sanding finishes. If you are sanding without a liquid lubricant, (sometimes sold as "no-load" or "self-lubricating" sandpaper). If you are using a lubricant, then wet/dry silicon-carbide sandpaper is better because of its water resistance and its hard paper backing. sandpaper is available up to 400 grit. Wet/dry sandpaper is available up to 2000 grit. sandpaper is usually a light gray color; wet/dry sandpaper is black. (See "Sanding Basics"). Both types of sandpaper still clog when used on a finish, particularly if the finish hasn't totally cured. They just clog less than other types. The finish rolls up into little balls, called corns, and sticks in the sandpaper grit . You should check the sandpaper often and remove these corns with a dull scraper, or change to new sandpaper. The corns will put deep scratches in the finish.

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. (See "Synthetic Steel Wool" Also See A, B.) The finest steel wool is #0000. You should use this or #000 when rubbing a finish.

Rubbing compounds are very fine powders suspended in a paste or liquid. These compounds use grits of powders that are almost always finer than the grit of the finest steel wool. They usually produce sheens higher than that produced by #0000 steel wool. Pumice (finely ground lava) and rottenstone (finely ground limestone) are powders that you can make into your own rubbing compound by mixing them into a thin paste with water or mineral oil. Pumice and rottenstone are traditional rubbing abrasives, but they've been largely replaced by synthetics you can buy already prepared in paste or liquid form. It's often difficult to compare grits between brands, so it's best to stay within one brand if you're rubbing to a progressively higher sheen .

Choice of Lubricants 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 Each of these lubricants is effective and has its advocates.

To use them, wet the surface liberally and keep it wet as long as you are rubbing. Mineral spirits evaporates slower than naphtha, so it's usually the better choice between the two. Mineral spirits allows for fast cutting with very little corning. Liquid or paste wax and non curing oils, such as mineral oil and vegetable oil, almost totally eliminate corning but significantly slow cutting. You can mix mineral spirits with wax or oil to blend the characteristics if you want. Soapy water works well with steel wool, but it is not very effective in preventing corning on sandpaper. Using water can cause its own problems. If you cut through the finish, the water may raise the grain of the wood, a defect that will be very difficult to repair. However, you don't have to worry about rust unless you intend

to apply another coat of water-based finish on top, in which case, be sure to first clean the surface well. Some manufacturers sell paste soap under names like "Wooling Wax," "Wol Wax," "Wool Lube," and "Murphy's Oil Soap." None of these products contains any wax or oil, and the reference to wool means they will lubricate steel wool. Any of these lubricants will reduce the scratching of the steel wool a little, and the liquid will keep the steel wool particles from circulating in the air you breathe. But the lubricant will disguise rub-through so you won't know they're there until the lubricant has evaporated. By then you've usually done considerable damage. A lubricant also makes it difficult to judge the sheen being produced. You can't see what you're doing. I suggest you use a lubricant with sandpaper to reduce corning, but not with steel wool until you've rubbed a few finishes without it. Then you'll have a better feel for how much you can rub without cutting through.

Self-Check 2	Written Test

Directions: Fill blank space . Use the Answer sheet provided in the next page.

1. What are four types of lubricant for rubbing out?5 point

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score =

Information Sheet 2.3Types, characteristics, uses & limitations of decorative surfaces

Types of Finish and Finishing Materials

Depending up on the species of wood from which a wooden article is made, its designation and the requirements that it must meet; the finish may be made in various ways. In accordance with the existing classification the finish may be transparent finish, Opaque finish, and Imitation finish.

1.1**Transparent finish**

Transparent finish is the most widely applicable in woodworking industries. It is employed when manufacturing articles of valuable species of wood or veneered articles. Its main purpose is to create durable, transparent, colored or colorless, smooth, shining, or dull protective and decorative film on the surface which shows up to the maximum or improve the natural qualities of valuable species of wood. Materials such as varnish, lacquer, shellac, and the like are considered as transparent finishing materials because they do not hide the natural texture or figure of the wood instead they retains or magnifies it.

1.2 **Opaque finish**

Opaque finish is another type of finish which has the aim of creating durable, opaque, colored, smooth, lustrous or dull protective and decorative layer on the surface concealing the natural texture or figure of the wood. An opaque coating is used for articles made from cheap or invaluable species of wood lacking a pretty or beauty texture. It can also be used for articles designed for special purposes (kitchen, hospital, etc) and out-door furniture's. Paint is typical example of an opaque finish.

1.3. **Imitation finish**

Imitation finish is used when manufacturing articles of cheap soft woods and hard woods. Its aim is to create a new texture on the surface or to give fibers of the cheap woods the colors of valuable species of wood. In this instance the protective and decorative film may be either transparent or opaque.

Self-Check 3	Written Test

Directions: Fill blank space . Use the Answer sheet provided in the next page.

1. _____is the most widely applicable in woodworking industries.

2. _____ is used when manufacturing articles of cheap soft woods and hard woods.

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

Information Sheet 2.4 Laying out materials based on specification

There are three good reasons for finishing wood: to help keep it clean, to help stabilize it, and to decorate it.

Sanitation

Wood is a porous material. It contains countless holes of various sizes. These can accommodate dirt & grime from handling, atmospheric contaminants, and food. Grimy wood is unattractive, and it can be a health hazard, providing a breeding place for bacteria. A finish seals the porous surface, making it less susceptible to soiling and easier to clean.

Stabilization

Besides being porous, wood is hygroscopic; it absorbs and releases moisture. Moisture with in wood is called moisture content; moisture in the environment is either liquid water or liquid vapor (humidity). Wood responds to changes in the level of moisture around it. If you put very dry wood in water or in an area of high humidity, the wood will absorb moisture and swell. If you put wood that has high moisture content in a relatively dry climate, the wood will release moisture and shrink. These dimensional changes, commonly called wood movement, do not occur consistently throughout a piece of wood. The surface of wood, for instance, responds more readily than the core. Wood swells and shrinks mainly across the grain; that is, in the width and thickness of boards, not appreciably in the length. And wood swells and shrinks more around the annual growth rings than it does perpendicular to the rings. The result of these different responses is that wood movement generates great stresses in wood and on the joints that hold pieces of wood together. The stresses causes splitting, checking. Warping and weaken in

Self-Check 4	Written Test

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

1. What are three good reasons for finishing wood?5point

1._____

2._____

3._____

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

Information Sheet 2.5 Selecting suitable joining points based on the design.

2.5 Selecting suitable joining points based on the design

how to select an appropriate joining method.

Joining is a very broad category of engineering processes. Joining, as the name implies, simply refers to the process of attaching components together. The components can be the same or different materials, and the durability of the joint can be temporary or permanent.

We encounter examples of joined components everyday in our lives: from the adhesives holding our cardboard and plastic food containers together, to the threaded caps keeping our beverages in our bottles, from the soldering & brazing enabling our electronic gadgets to function, to the welds, adhesives, and fasteners holding our cars together. Without the ability to join components, we would not be able to enjoy the technologies and luxuries we take for granted every day.

What is mechanical joining?
Mechanical Joining is a process for joining parts through mechanical methods, which often involve threaded holes. Joining parts using screws or nuts and bolts are common examples of mechanical joining.

Fig2.1

Fig. 2.2

Self-Check 5	Written Test

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

1. _____is a process for joining parts through mechanical methods, which often involve threaded holes. Joining parts using screws or nuts and bolts are common examples of mechanical joining.?

2._____ is a very broad category of engineering processes.?

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score =

Information Sheet 2.6 Preparing materials for cutting in line with work requirement

2.5 Preparing materials for cutting in line with work requirement

A finish slows moisture exchange, thus reducing the stresses and stabilizing the wood. As a general rule, the thicker the coating of finish the better it limits moisture exchange. This exchange does not have to be in the form of liquid water. It can be, and usually is, water vapor. Water vapor exchange causes much damage to otherwise sheltered wood furniture and woodwork. It just does this more slowly than in wood subjected to liquid-water exchange

Decoration

In addition to stabilizing wood and protecting it from dirt and grime, finishing wood is decorative. Even if you apply nothing more than simple oil or wax finish, you are making a decorative choice. There are an infinite number of ways you can decorate wood, but all can be grouped into three categories: color, texture, and sheen.

- **Color**

  There are four ways you can apply color to wood.

  - ✓ If you change the color through chemical reaction, it is called Bleaching or chemical staining.
  - ➢ Bleaching takes the color out of the wood; leaving it almost white. Chemical stains react with chemicals natural to the wood or added to the wood to change color.
  - ✓ If you apply a colorant directly to wood, it is called Staining.
  - ➢ Stain applied to bare wood amplifies the figure and grain of the wood. Stain also highlights problems in the wood, such as scratches, gouges, machine marks and uneven density.
  - ✓ If you apply a colorant between coats of finish, it is called, glazing.
  - ➢ Glaze, applied thinly and evenly to an entire surface, changes the tone of the woods color's and may highlight pores and recesses. Applied thickly,

glaze can be manipulated with various tools to imitate wood grain, marble, or other faux (false) effects.

- ✓ If you add a colorant to the finish itself and apply it to the wood, it is called Toning or shading if you can still see the wood through the colored finish; it is called painting if you can't. Each of these methods produces a different effect.

- ➢ Shading, Toning and Painting change the tone of the wood's color without highlighting pores and recesses. Shading and toning allow you to see the figure and grain of the wood. Painting totally obscures the wood's features. Shading changes the color tone only in the areas you want. Toning changes the color tone evenly over the entire surface.

❖ **Texture**

All woods have a natural texture dependent up on the size and distribution of the pores. You can preserve this texture by keeping a finish very thin. This thin-finish look is very popular. It's often called a natural wood look, and it is what you get when you finish with oil or wax. You can get the same look with film finishes, such as varnish, shellac, lacquer, or water base, as long as you keep them thin. By filling or partially filling the pores, you can completely alter the texture of the wood. You can fill the pores with paste wood filler, or with many coats of finish that you sand or scrape back. The most refined finishes have filled pores. (For example, those commonly used on very expensive dining table tops).

Self-Check 6	Written Test

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

1 What is texture ? 4points

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

LG #-31	LO #3. CONSTRUCT AND APPLY DECORATIVE SURFACES

Instruction sheet

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

- Laying out & cutting material to size & required thickness
- Using machinery in accordance with workplace procedures
- Joining process with to workplace procedures and job requirements
- Applying adhesives according to workplace procedures/instructions
- Checking work against required quality standards & any non-conformity rectifies

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:

- Lay out & cut material to size & required thickness
- Use machinery in accordance with workplace procedures
- Join process with to workplace procedures and job requirements
- Apply adhesives according to workplace procedures/instructions
- Check work against required quality standards & any non-conformity rectifies

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets

Information Sheet 3.1 Laying out & cutting material to size & required thickness

3.1. Laying out & cutting material to size & required thickness

Fig 3.1 lay out

The main reason to apply a finish to wood is for protection. Wood is a porous material that will absorb moisture, dirt and oils. Protecting your wood projects with a finish will keep it looking good for years to come. Also, finishes improve wood's appearance. Stains highlight and add color to wood grain and finishes seal in the color, increasing its longevity. Even basic clear finishes add sheen and warmth to wood.

How to Finish Wood

Fig 3.2 cutting in size

Finishing wood is the final step in any woodworking project. Select the perfect finish to bring your wood project to life and protect it for years to come.

Prepare the Wood

Fig 3.3 Sanding

- Prepare surface of the wood by sanding to smooth down scratches or snags.
- Sand with the grain of the wood. Use a coarse 120-grit sandpaper if there are deep gouges or imperfections in the wood.
- Repeat the sanding process with a progressively finer grit sandpaper until you are satisfied with the surface of the wood.
- Wipe down the surface with a clean cloth or tack cloth to remove dust and other excess materials.

Sand with the grain of the wood. Use a coarse 120-grit sandpaper if there are deep gouges or imperfections in the wood.

- Repeat the sanding process with a progressively finer grit sandpaper until you are satisfied with the surface of the wood.
- Wipe down the surface with a clean cloth or tack cloth to remove dust and other excess materials.

Self-Check 1	Written Test

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

1 What is the final step in any woodworking project to finish? 5points.

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score =

Information Sheet 3.2 Using machinery in accordance with workplace procedures

3.2 Using machinery in accordance with workplace procedures

Cutting to sizes

Finishing of wood requires careful planning to ensure that the finished piece looks attractive, performs well in service and meets safety and environmental requirements.

Planning for finishing begins with the design of furniture.

Care should be taken to ensure that edges of furniture are rounded so they can be adequately coated and are able to resist wear and cracking.

Careful attention should also be given to the design and strength of wooden joints to ensure they do not open-up in service and crack the overlying finish.

Care should also be taken to eliminate recesses in furniture, which are difficult to finish with some systems, especially UV-cured finishes.

Planning for wood finishing also involves thinking about the properties of the wood that you are going to finish, as these can greatly affect the appearance and performance of finishes, and also the type of finishing system that will give the wood the characteristics you are seeking. For example, woods that show great variation in color between sapwood and heartwood or within heartwood may require a preliminary staining step to reduce color variation.

Alternatively, the wood can be bleached to remove the natural color of the wood and then stained to the desired color.

Woods that are coarse textured such oaks and other ring-porous hardwoods may need to be filled before they are finished to ensure the coating can bridge the pores and resist cracking. The pores in ring-porous woods preferentially absorb pigmented stain, and advantage can be taken of this to highlight the wood's grain.

Some tropical woods, such as rosewood (Dalbergia nigra), cocobolo (Dalbergia retusa) and African pad auk (Pterocarpus soyauxii), contain extractives such as quinines, which

retard the curing of unsaturated polyester and UV-cured acryl ate coatings, and so other finishing systems should be used with these species.

Self-Check 2	**Written Test**

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

1. What are the workplace procedures when using machinery 5points

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score =

Information Sheet 3.3 Joining process with to workplace procedures and job requirements

3.2 Joining process with to workplace procedures and job requirements

Specific Power Equipment

To operate a machine safely, you must know more than just how to turn it on and off. You must know how to perform basic operations. You also need to know how to make simple adjustments. Above all, you must know the machine's limits. Always keep the machine at a safe, steady speed. Never use the machine for a job the machine was not designed to do.

Safety Rules for Band Saws Wheel guard doors must be closed, and the blade properly adjusted, before turning on the machine. Adjust the upper guide assembly so it is ¼ in. above the work. Allow the saw to reach full speed before feeding the work. Never turn the machine on with stock pressed against the blade. Never reach close to the blade or under the table while the machine is running. The stock must be held flat and firmly against the table. Do not remove stock or scraps until the blade has stopped.

- Make multiple angled cuts to achieve a cut with a tight radius. Feed the saw only as fast as the teeth can easily remove the wood. Maintain a 2 in. margin of safety. Plan saw cuts to avoid backing out of curves whenever possible. Make turns carefully and do not cut radii so small that the blade is twisted.

- Use a push stick to finish a re-sawing or ripping cut. Stop the machine before backing out of a long, curved cut. Round stock should not be cut unless mounted securely in a jig or hand screw.

Safety Rules for Jointer Be sure you have the instructor's approval to operate the machine. Before turning on the machine, make adjustments for depth of cut and position of fence.

- Do not adjust out-feed tables or remove guard without the instructor's approval. The maximum cut for jointing an edge is 1/8 in.; for a flat surface, 1/16 in.

- Stock must be at least 3/8 in. thick, unless a special feather board is used. Feed the work so the knives will cut "with the grain." Use only new stock that is free of knots, splits, and checks. Keep your hands away from the cutter-head even though the guard is in position. Maintain at least a 4 in. margin of safety!

- Use a push block when planning a flat surface. Do not plane end grain unless the board is at least 12 in. wide.

- The jointer knives must be sharp. Dull knives will vibrate the stock and may cause a kickback.

Power Equipment Safety Rules

Modern power woodworking machines can save large amounts of time. Learning how to use them safely will be an important part of your experience in the shop. Whether or not you are permitted to use power equipment will depend on your maturity and ability, along with policies established by your instructor.

Self-Check 3	Written Test

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

1 write process with to workplace procedures and job requirements?4 points

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score =

Information Sheet 3.4 Applying adhesives according to workplace procedures/instructions

3.4.Applying adhesives according to workplace procedures/instructions

Applying Adhesives

The term adhesive is generally used to describe only substance or bonding material capable of holding objects together by surface attachments. Adhesives are the most popular agents used today. There are two basic types of adhesives. Those are:

A. **Thermoplastic:** are the most widely used adhesives in the wood work. Those are generally resistant to moisture, but are not water proof. Examples are animal glue and soon.
B. **Thermo sets**: are generally more costly than thermoplastics, but are resistances to water and are not affected by heat. Examples are urea formaldehyde, resorcinol formaldehyde and soon.

Same common terms in adhesives

Pot life: is the amount of time of glue remains usable and workable.

- **Shelf life**: is the amount of time after package is opened and that glue remains usable and workable.
- **Clamping life**: is the amount of time required to hold the work under clamping pressure till glue developing sufficient strength.
- **Holder/ catalyst/ accelerator**: supplied separately to be mixed with resin in the form of powder or liquid for separate applications of glues or in powder form mixed together powder resin for mixed application.

- **Gap filling**: glue such as hide glue or preferable urea formaldehyde glues are capable of supporting a thick glue line to fill in joints,
- **Filler**: material added to resin glue to extend glue and give them better gap filling properties.
- **Creep**: continued displacement under constant load to undesirable properties of PVA glues
- **Observation/ Evaporation**: action by which PVA, hide glues solidifies by losing the solvent.
- **Started joint**: condition glue joint when too much has been squeezed out from high clamping pressure.
- **Assembly time**: is the amount of time glue remains workable after it has been applied to wood.

Self-Check 4	Written Test

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

1 Write types of adhesives and their uses?5point

2 Write the procedure Same common terms in adhesives? 4points.

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

Information Sheet 3.5 Checking work against required quality standards & any non-conformity rectifies

3.5. Checking work against required quality standards & any non-conformity rectifies

Automated wood finishing methods

Manufacturers who mass-produce products implement automated flat line finish systems. These systems consist of a series of processing stations that may include sanding, dust removal, staining, sealer and topcoat applications. As the name suggests, the primary part shapes are flat. Liquid wood finishes are applied via automated spray guns in an enclosed environment or spray cabin.

The material then can enter an oven or be sanded again depending on the manufacturer's setup. The material can also be recycled through the line to apply another coat of finish or continue in a system that adds successive coats depending on the layout of the production line. The systems typically used one of two approaches to production. In this hang line approach, wood items being finished are moved through various finishing stages on a conveyor system

Hang line approach.

In the hang line approach, wood items being finished are hung by carriers or hangers that are attached to a conveyor system that moves the items overhead or above the floor space. The conveyor itself can be ceiling mounted, wall mounted or supported by floor mounts.

A simple overhead conveyor system can be designed to move wood products through several wood finishing processes in a continuous loop. The hang line approach to automated wood finishing also allows the option of moving items up to warmer air at the ceiling level to speed up drying process.

Self-Check 5	Written Test

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

1.when Checking work against required quality standards? 5point

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

LG #- 32	**LO # 4.COMPLETE WORK**

Instruction sheet

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

- Cleaning, maintaining& storing tools according to workplace instructions
- Cleaning & lifting machineries in a safe mode in accordance with manufacturers'.
- Tagging & reporting faulty /defective equipment with workplace practices.
- Collecting & storing off-cuts and unused materials for reuse or disposal
- Dealing with waste & scrap materials following workplace procedures and OHS rules

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:

- Clean, maintain& store tools according to workplace instructions
- Clean & lift machineries in a safe mode in accordance with manufacturers'.
- Tagg & report faulty /defective equipment with workplace practices.
- Collecting & store off-cuts and unused materials for reuse or disposal
- Deal with waste & scrap materials following workplace procedures and OHS rules

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the "Information Sheets". Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
3. Accomplish the "Self-checks" which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to "Operation sheets

Information Sheet 4.1 Cleaning, maintaining& storing tools according to workplace instructions

Cleaning, maintaining& storing tools according to workplace instructions

What should your employees know before moving handling and storing materials
Stored materials must not create a hazard for employees. Employers should make workers aware of such factors as the materials' height and weight, how accessible the stored materials are to the user, and the condition of the containers where the materials are being stored when stacking and piling materials.

Pointers to follow in storing tools and equipment:

1. Have a designated place for each kind of tools.
2. Label the storage cabinet or place correctly for immediate finding.
3. Store them near the point of use.
4. Wash and dry properly before storing.
5. Store knives properly when not in use with sharp edge down.

the good practices for the proper storage of tools:

- Set a space specifically for the storage of tools and equipment. .
- Organize all the tools with the same category such as nails, cords, screws etc.
- Clean the tools before placing in the storage.
- Get shelves for easy access and labeling

some helpful tips on how to clean and properly store your tools.

1. Keep Power Tools Clean. Dust and grime can bring your power tools to a grinding halt if left unchecked over time.
2. Store Power Tools Correctly.
3. Inspect for Wear or Damage.
4. Lubricate Moving Parts.
5. Keep Batteries in Shape.

10 Basic Safety Rules For Using Hand Tools

- Inspect regularly. Regularly inspect your tools to make sure that they are in good condition.
- Wear gloves. Always wear appropriate personal protective equipment.
- Carry with care. Never carry tools up a ladder. ...
- Don't pocket sharp objects.
- Be aware of your surroundings.
- Use the right tools.
- Follow instructions.
- Clean and return.

If you take care of your tools, they will return the favor. Proper care and routine maintenance of your hand tools and power tools makes any home improvement or repair project easier, safer and more successful. Proper tool care also saves you money because the better they're cared for, the longer they'll last.

HAND TOOLS

Hand tools such as screwdrivers, wrenches, hammers, pliers, levels, and wire cutters are examples of common household tools that are often left out in places such as basements, garages and tool sheds. Tools are tough, but they are not indestructible and exposure to the elements can take its toll.

Below are some tips on how to take care of your tools and store them properly so that you get optimum use out of them.

- **Clean, Inspect and Care for Tools**
- **Store Tools Properly**

POWER TOOLS

Power tools such as electric drills, saws, sanders and nailers need routine maintenance just like your hand tools. Because of their mechanical and electrical parts, power tools are more susceptible to problems caused by poor maintenance, dust and debris accumulation and general malfunction. The following are some helpful tips on how to clean and properly store your tools.

- **Keep Power Tools Clean**
- Store Power Tools Correctly
- Inspect for Wear or Damage
- Lubricate Moving Parts
- Keep Batteries in Shape

Self-Check 1	Written Test

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

1. what are the basic safety rules for using hand tools?4points

2 **.** what are the Pointers to follow in storing tools and equipment 5points

.

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

Information Sheet 4.2 Clean & lift machineries in a safe mode in accordance with manufacturers'

materials handing and storage

Storage of Other Materials

a. When storing materials, employees shall:

(1) Prevent creating hazards when storing materials by being aware of the material's height and weight; how accessible the stored materials are to the user – consider the need for availability of the material; and the condition of the storage containers. All materials stored in tiers must be stacked, racked, blocked, inter-locked, or otherwise secured to prevent sliding or collapse.

(2) Keep storage areas free from accumulated materials that may cause slips, trips, falls, or fires or that may contribute to harboring pests.

(3) If possible, place bound materials on racks and secure it by stacking, blocking, or inter-locking to prevent it from sliding, falling, or collapsing.

(4) Stack lumber no more than 16 feet high if handled manually and no more than 20 feet if using a for lift.

a. Remove all nails from used lumber before stacking it.

b. Stack and level lumber on supported bracing.

(5) Ensure stacks are stable and self-supporting. Observe height limitations when stacking materials.

(6) Stack bags and bundles in interlocking rows and limit the height of the stack to keep them secure.

(7) Block the bottom tiers of drums/barrels to keep them from rolling if stored on their side.

a. Stack drums/barrels/kegs symmetrically.

b. Place planks, pallets, etc. between each tier of drums/barrels/kegs to make a firm, flat stacking surface when stacking on end.

c. Chock the bottom tier on each side to prevent shifting in either direction when stacking two or more tiers high.

(8) Materials must not be stored on scaffolds or runways in quantities exceeding those needed for immediate operations.

b. Additional safe material storage practices include:

(1) Ensuring shelves and racks are sturdy and in good condition.

(2) Stacking all materials on a flat base.

(3) Placing heavier objects closer to the floor and lighter/smaller objects higher.

(4) Not stacking items so high that they could block sprinklers (18” of clearance) or come in contact with overhead lights or pipes.

(5) Using material-handling equipment or a ladder to place or remove items above your head.

(6) Never standing on a shelf, rack, boxes, or a chair.

Self-Check 2	Written Test

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

1 Write three steps to prepare the surface of wood for finishing ?5point

2 Write the difference between cleaning and smoothing? 5points

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

InformationSheet 4.3 Tagging & reporting faulty /defective equipment with workplace practices.

4.3 Tagging & reporting faulty /defective equipments with workplace practices.

Woods have a natural texture that results from the size and distribution of the wood pores. Some species, such as maple and cherry, have a smooth, even texture because their pores are small and uniformly distributed; others such as walnut and mahogany, have a coarse, even texture because their pores are fairly large and uniformly distributed. Still other species, such as plain sawn oak and ash, have uneven (alternately smooth and coarse) texture because their pores vary in size (the spring growth pores are much larger than the summer growth pores).

Though you often can't make one wood like another (how you apply a finish can affect the woods texture) as long as you are using a film-finish. If you apply a finish thinly, the finished wood will have almost the same texture as the unfinished wood. If you fill or partially fill the pores of the wood while you are applying the finish, you can significantly change the woods appearance. A mirror finish results when you totally fill the pores.

Therefore, wood fillers are used for the purpose of leveling the surface of wood by filling the open pores or cavities in the cell of wood. When the pores are filled, the wood surface becomes smooth, hard, and ready for any finish. Besides, fillers have a tendency to prevent moisture from entering the wood.

There are two common types of wood fillers. Namely: paste fillers and liquid fillers. The paste and liquid fillers also called as grain/pore filler and finish/clear filler respectively. The traditional wood filler used by most woodworkers is paste wood filler. However, liquid fillers provide additional choices.

Paste wood filler is composed filler material, binder, and usually a colorant. The filler material, which does the actual filling, is silica, calcium carbonate, and clay. The binder, which glues the filler material with the wood, is oil or varnish (commonly referred to as oil-based) or water-based finish. The colorant is pigment. (Dye is not a good choice for paste wood filler because it may fade over time, leaving the pores lighter than the overall color of the wood).

There are two types of paste wood fillers: Oil-based and water-based.

- Oil-based fillers are easier to apply because you have a lot more working time. But, these fillers cause more problems when you apply a finish because the finish wrinkles and doesn't dry hard when you apply the finish before the filler was fully cured and the oil in the filler go to in the finish.
- Water-based fillers are more difficult to apply because they dry so quickly but, there are rare problems applying a finish over them. Because much easier removal of the excess filler, more control over coloring the pores, better depth in most cases.

Walnut, oak, ash, and mahogany are some of the common hard woods that have large open pores. They are referred to as open-grain woods. For a smooth surface finish these pores need to be filled with paste filler.

Apply the paste wood filler with a stiff brush or putty knife. Thoroughly coat the surface first, by brushing with the grain, and then across the grain. On a small surface, simply pour out a small amount of filler and spread it with your finger tips or the palm of your hand. In a short (10-20 minutes) the filler will lose its wet or shiny appearance. The excess should be wiped off at this time. Use a coarse rag or piece of burlap and wipe across the grain. Use the palm of your hand to smooth the surface and pack the paste into the wood pores.

The filler should be in the pores of the wood not on the surface. Finish by wiping with/along the grain using very light pressure. Use a rag warped around a small stick to remove excess filler from corner and small openings.

Once the filler is hardened, it is difficult to remove. Therefore, apply filler only to sections or areas that can be wiped before it becomes too hard. A cloth lightly saturated with minerals sprits may be used to remove fillers that have partially hardened. Inspect the surface carefully. If the pores are not properly filled, repeat the operation after one hour. After the filled surface has dried overnight, it can be sanded lightly with fine sandpaper.

You can apply paste wood filler either directly to the wood or over sealed wood. If you apply colored filler directly to the wood, the filler stains the wood in addition to filling the pores. If you apply colored filler on to sealed wood, the filler colors only the pores. In all cases you get a better final result if you fill twice, waiting until the first filling is dry before applying the second.

Whenever paste filler is not desirable, clear/liquid filler may be used to fill the pores of open-grained wood. Apply a number of coats of finish and sand them back until the dips in the pores become level. They produce a bright and deep appearance, but considerable time and effort are necessary for their application. If the final coat of the piece will be lacquer, it may be easier to fill the pores with several coats of sanding sealer [varnish or lacquer with mineral soap added]. It is easy to sand and less expensive than lacquer. Each coat should be sanded, but not through the finish. Clear fillers produce a deeper finish than paste filler, but require more time and work. Clear fillers may be applied by brushes or spraying equipment. It is possible to do this with any finish (varnish, lacquer, and shellac) that cures hard enough so it can be

Self-Check 3	Written Test

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

1. write types of paste wood fillers 4 point

2 .Why Oil-based fillers are easier to apply.? 4point

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score =

Information Sheet 4.4 Collecting & storing off-cuts and unused materials for reuse or disposal

4.1. Collecting & storing off-cuts and unused materials for reuse or disposal.

collecting includes seeking, locating, acquiring, organizing, cataloging, displaying, storing, and maintaining items that are of interest to an individual *collector*. Collections differ in a wide variety of respects, most obviously in the nature and scope of the objects contained, but also in purpose, presentation, and so forth. The range of possible subjects for a collection is practically unlimited, and collectors have realised a vast number of these possibilities in practice, although some are much more popular than others.

What is material storage?

storage involves the provision of adequate space, protection and control for materials, components and equipment that are to be kept on a construction site during the building process. There are several factors to be considered when deciding on the amount and nature of storage required.

Dealing with furniture manufacturing waste

Furniture manufacturing processes can generate high levels of waste. Any action you can take to reduce or even eliminate waste can save you money and reduce your business' impact on the environment. Where your business does produce waste you need to decide the best option for dealing with it.

Reuse furniture manufacturing waste

After elimination and reduction, reusing waste products is the next best way to use your business' resources more efficiently. You should ensure that the maximum volumes of waste are reused, for example by:

- identifying the smallest usable component in your manufacturing process - any waste material below this minimum size will not be reusable

- redesigning your product range to incorporate waste materials as either an essential component or a design feature
- producing a new product from waste materials
- processing waste to incorporate into another product
- using waste as packaging materials for finished goods during shipping and transporting

If you can't reuse the waste your business produces on site, look closely at the other businesses in your supply chain

Furniture manufacturing waste to energy

Investing in a combustion plant can enable your business to generate heat from wood waste. The benefits of wood combustion include:

- a reduction in your reliance on outside energy sources
- reduced fuel costs
- lower landfill and waste disposal costs
- increased self-sufficiency

You must ensure that the waste you use in a combustion plant doesn't contain any halogenated materials that include PVC edgings or chlorine. Burning these materials will mean that your plant does not comply with the strict emissions regulations that are in place. This would also produce acid gases that erode ductwork.

Self-Check 4	Written Test

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

1. What is material storage?5points

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

Information Sheet 4.5 Dealing with waste & scrap materials following workplace procedures and OHS rules

4.3 Dealing with waste & scrap materials following workplace procedures and OHS rules.

Any substance which can give color to the wood is called a stain. Stain is a transparent finish. It put on wood to produce a particular color and decorate qualities of the valuable species of wood. In addition, it is applied to improve its appearance and adds 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.

3.1. Classification of stains

Based on the solvents used in making them stains are classified into five groups. These are: water stains, oil stains, sprit stains, None-grain raising (NGR) stains, and chemical stains.

3.1.1. Water stains: any stain, whether pigment, dye, or both, which contains a water-based binder is called 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 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

- 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.

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.

. 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. The sealer is especially important on dark stains such as mahogany or walnut to prevent the stain color from bleeding into the finish coat. Lighter tones can be produced by thinning or by wiping dark stain immediately after application. Soft porous woods are usually given a wash coat of shellac (seven part of alcohol, one part of shellac) before applying a penetrating stain. End grain may be coated with mineral spirits or thinned linseed oil before applying an oil type stain. This prevents excessive penetration.

- 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.

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.

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

Wipe off the excess stain quickly with a cloth. Let the stain dry overnight.

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

NGR stains: Industry uses a stain similar to sprit stain called NGR (None-grain raising). 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.

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

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. Both methods are widely used in the cabinet and furniture industries, but both require a little practice to get right. To spray the stain successfully, it is best to thin it and make several passes. To wash coat just the end grain, wipe or brush a thinned finish on to it alone, and let dry hard before sanding. Instead of finish, you can use thinned white or yellow glue, or you can use a commercial product called GLUE SIZE, which sands more easily than common white and yellow glue.

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. Changing a garish, unpleasant color to a softer more attractive one that will take a place in a color schemes is an important reason for staining.

2. Greater beauty in a particular article can often be secured by staining. This can sometimes 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.
- The end grain becomes too dark.
- The stain comes out blotchy on the wood.

Self-Check 5	Written Test

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

1 write Common staining problems?4 point

2 write Procedures to apply oil stains?4 point

3 write Advantages of water stains? 3points

Note: Satisfactory rating 100 points

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

Answer Sheet

Name: _____ Date: _____

Score = _____

PARTICIPANT NAME

1	Mebratu W/Yohannes	BSC Wood Work Technology	Oromia	mebratuw4@gmail.com Tel. 0913162766
2	Kedir Nejat	BSC in Wood Science and Technology	Oromia	kedirnejat@gmail.com Tel. 0921125276
3	Tsegayee Biru	BSC in Wood Science and Technology	Oromia	Tel. 0921822866

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