Prepare Surfaces for Finishing

Learner’s Guide
Prepare Surfaces for Finishing

Learner’s Guide
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Prepare Surfaces for Finishing
Section 1 – Introduction

This topic of the furnishing training package explores how to prepare surfaces for the application of surface coatings by hand or machine. This will include learning about the:

- types, properties and characteristics of coatings
- surface preparation techniques and equipment/materials
- hazardous substances and materials used in surface preparation
- workflow in relation to the application and removal of surface coatings.

As part of the assessment requirements for this training package, you must be able to:

- interpret a work order and locate and apply relevant information
- apply safe handling procedures for equipment, products and materials, including use of personal protective equipment
- follow work instructions, operating procedures and inspection practices to:
  - minimise the risk of injury to self or others
  - prevent damage to goods, tools, equipment or products
  - maintain required production output and product quality
- prepare surfaces on a minimum of four occasions, including:
  - horizontal surfaces
  - vertical surfaces
  - internal surfaces
  - curved surfaces (mouldings)
- surfaces are to include:
  - hardwood
  - softwood
  - veneered board
- work effectively with others
- modify activities to cater for variations in workplace contexts and environments.
Required resource materials

As you work through this unit you will be required to obtain information to fill in the blanks throughout this learner’s guide and complete some exercises. Whilst some of this information can be provided by reflecting on your experiences from the workplace and through discussion with your lecturer/trainer, other information can only be obtained from the relevant presentations delivered by your lecturer/trainer or from your own further research. You may also find the following resources useful.

Suggested text resources


Suggested web-based resources

www.nortonabrasives.com

Suggested audiovisual resources

*Preparing wood c* 1994, video recording, Meridian Education Corporation, New York. This video details how to repair and prepare a piece of wood for staining. It covers sanding, using hard-drying wood dough, pre-sealing, pre-wetting, using paste and woodfiller, and repairing blemishes.
Section 2 – Surface preparation

Surface preparation is the most important part of any finishing process, and is the foundation upon which you build the rest of your finish.

When your work is presented for polishing, it must be free of all surface blemishes.

Activity 2.1

After viewing a presentation regarding surfaces, defects and fillers, or discussing these with your lecturer/trainer, complete the following information.

Surface preparation is the process of ____________________________ in readiness for finishing. Surface preparation covers everything from ____________________________ to ____________________________.

The key to a good finish is ____________________________ _____________________________. Failure to ____________________________ for the finish will result in the _____________________________.

Surfaces to be finished may be ____________________________

_________________________ or ____________________________

and the finish may be ____________________________

_________________________ or ____________________________.
Timber surfaces

Different timbers require different preparation before they are ready to be finished (polished). The type of cell structure of the wood affects the preparation required.

Timbers are divided into two categories, defined by their cell structure:

- hardwood
- softwood.

Hardwood

Hardwood is classified as pored wood. It has an open-grain appearance. Hardwood trees have the following characteristics.

- 
- 
- 
- 
- 
- 

Softwood

Softwood is classified as non-pored wood. Softwood trees have the following characteristics.

- 
- 
- 
- 
- 
- 

Hardwood belongs to the classification of timber called ________________, and softwood belongs to the classification called ________________. After the timber has been converted and seasoned, the difference between the two can be seen only with a microscope. It is worth noting, however, that if a timber is hardwood it does not necessarily mean that the wood is hard. For example, balsa is a hardwood but it is not a hard wood!
List some common examples of hardwood and softwood in the table below.

<table>
<thead>
<tr>
<th>Hardwood</th>
<th>Softwood</th>
</tr>
</thead>
<tbody>
<tr>
<td>•</td>
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<td>•</td>
</tr>
</tbody>
</table>

Under the microscope

![Fig 2.1 Hardwood](image1)
![Fig 2.2 Softwood](image2)

The main difference in the structure of the two types of timber is that hardwood has a series of long straw-like pores through which moisture and nutrients are transported around the tree. Softwoods conduct this same activity through microscopic cells known as tracheids.
Manufactured boards

Manufactured boards are produced in a range of sizes, thicknesses and finishes.

**Activity 2.2**

When sanding and preparing the veneered surfaces of these boards, you must take care to avoid exposing the core material. It is best to cover any exposed edges with solid timber or treat and polish them. Examples of manufactured board are:

- 
- 
- 
- 
- 
- 
- 

**Discussion**

How many of the listed manufactured boards do you use at your workplace? What kinds of products are manufactured from these boards? Do you use similar materials to others in your group for similar production?
Metals

Metals requiring surface coatings may also require surface preparation. Types of metal can be ferrous (iron-based) or non-ferrous (non-iron based). This is important to remember because ferrous metals will rust while non-ferrous metals will not rust. Below are some examples of these types of metal.

<table>
<thead>
<tr>
<th>Ferrous</th>
<th>Non-ferrous</th>
</tr>
</thead>
<tbody>
<tr>
<td>cast iron</td>
<td>aluminium</td>
</tr>
<tr>
<td>galvanised iron</td>
<td>brass</td>
</tr>
<tr>
<td>steel</td>
<td>copper</td>
</tr>
<tr>
<td>wrought iron</td>
<td>tin</td>
</tr>
</tbody>
</table>

It is worth noting, however, that all metals need to be degreased before surface coatings are applied.

Tools and equipment

The following tools are used to prepare surfaces for finishing:

- hammers
- nail punches
- sanding blocks
- scrapers
- chisels
- files
- steam irons.
Sanders

Furniture manufacturing methods demand fast and efficient sanding processes, so power sanders are now the order of the day. It is important to select the right sander for a particular job. This will depend on the type of work, the amount of material to be removed, the shape of the job and the degree of finish required.

Types of sanders
• disc sanders
• ______________________________________
• ______________________________________

Stoppings

Stoppings, also known as fillers or putty, are an essential part of the furniture-making process today. They are used to fill defects in new timber and also to repair furniture in restoration jobs.

Stoppings contribute to cost-effective processes and economical manufacturing procedures in the trade.

Discussion

There are many types of stopping and each has a specific use.

After viewing a presentation or discussing with your lecturer/trainer, complete the following table on stoppings.

<table>
<thead>
<tr>
<th>Stopping</th>
<th>Uses</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>wax sticks</td>
<td></td>
<td>• easy to apply</td>
<td>• does not set hard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• available in a variety of finishes</td>
<td>• is easily marked</td>
</tr>
<tr>
<td>epoxy filler</td>
<td>• for large holes or broken corners</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stopping</td>
<td>Uses</td>
<td>Advantages</td>
<td>Disadvantages</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------------------------</td>
<td>----------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>lacquer putty</td>
<td>• for nail holes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• for timber chips or</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>splits</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• dries hard</td>
<td>• should not be used by polishers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• variety of colours</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• affinity for lacquer</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• can be resoftened</td>
<td></td>
</tr>
<tr>
<td>shellac sticks/button</td>
<td></td>
<td>• sets very hard</td>
<td>• dries more slowly than lacquer putty</td>
</tr>
<tr>
<td>shellac</td>
<td></td>
<td>• dries quickly</td>
<td>• can bubble if overheated</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• can be coloured</td>
<td></td>
</tr>
<tr>
<td>beeswax</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>plastic wood</td>
<td>• handyman</td>
<td></td>
<td></td>
</tr>
<tr>
<td>epoxy resin</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Discussion

Have you had occasion to use any of these stoppings before? Is there any particular reason why you think that a mixture of glue and sawdust makes a good stopping? Does this mixture dry very hard? Will it dry as quickly as some of the professional stoppings?

Specifications

A job specification sheet (JSS) accompanies most manufacturing jobs. The specification sheet will usually convey the following information to the manufacturer.

- __________________________
- __________________________
- __________________________
  eg _________________________

The interpretation of the specifications will advise the cabinet-maker how much effort is required in the final clean-up process. However little or extensive the clean-up required, it is important to detect all faults in the timber and fix them appropriately before attempting any finish.

Rectifying faults

Discussion

Discuss some of the faults that you have encountered in jobs at your workplace with your lecturer/trainer, and outline your solution for the repair/fix.

Complete the list of requirements to show how to deal with the various furniture production faults.

Before applying a finish to any job, thorough inspection may reveal any of the following:
<table>
<thead>
<tr>
<th>Fault</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>veneer blisters</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>machine marks</td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>water marks</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>scratches, cross-sanding marks, pen/pencil marks</td>
<td></td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>grease or silicon marks</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>knots</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>glue marks</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fault | Solution
--- | ---
holes | 
| 
bruises | 
| 
veneer dents | 
| 

Reflection

Refer to your earlier discussion on how to rectify a problem that you had. Do you now have some other ideas that you could incorporate into the process of completing a similar repair?

Preparing surfaces

Discussion

Discuss how surfaces are prepared at your workplace with your lecturer/trainer before filling in the blanks. Think about a range of surfaces; for example, solid timber frames of carcasses, or solid timber chairs and/or table frames. Why do you think they are treated differently from company to company?

It is important to take care when preparing any surface. The roughness of the surface will determine the grade of abrasive paper you will use.
What you need to do:

-
-
-
-  

Types of surfaces

- most common in furniture production – tabletops, cupboards and drawers
- edges of tops, bolection moulding and pre-moulded cupboard doors
- legs, arms, etc usually sanded to a fine finish whilst in the lathe
- shaped components, such as chair backs and round table-rails

Cleaning up the work area

When you have finished preparing the surfaces, a thorough clean-up needs to be carried out. This should be conducted in accordance with workplace procedures for safety purposes. You should:

-  
-  
-  
-  

Notes
Section 3 – What is an abrasive?

Activity 3.1

After viewing a presentation or discussing abrasives with your lecturer/trainer, complete the following information.

An abrasive is any material that is ___________________________ and is used to wear away another material by ___________________________.

Abrading involves the scraping – 'cutting action' – of thousands of sharp-edged grains across a surface.

The first coated abrasive was developed in China in the 13th century. It was made from crushed shells glued to a piece of primitive paper called parchment. The glue used was the oldest form of adhesive known to humankind – animal glue. It would be several hundred years before the introduction of crushed glass, and another hundred years before natural minerals such as flint and quartz would prove to be useful tools.

In today's heavily industrialised society, many materials have been researched for their respective benefits to industry.

Abrasives today

Abrasives are available in three main forms. These are:

1. _____________________________
2. _____________________________
3. _____________________________

Bonded abrasives

Bonded abrasives are used in the furniture-making industry purely for ___________________________.

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Abrasive pads

Abrasive pads are colour-coded. Each colour represents a different coarseness of grit contained within the pad. They are made from a non-woven plastic that has _________________ or _________________ impregnated throughout its 3 mm thickness.

The pad is ideal for sanding between _________________ because it does not deteriorate during use. Only three or four grades are required for most polishing applications.

Coated abrasives

Coated abrasives are used in the furniture-making industry to sand timber components smooth and clean off any grease, glue and pencil marks in readiness for polishing. They are also used for cutting back between coats when polishing.

During the sanding process, a piece of work may appear smooth, but the grain’s ‘grits’ actually gouge _________________ into the surface of the timber. It is therefore essential to use progressively finer abrasive paper, so that the scratches become smaller and smaller. This is the process that makes the surface appear _________________.

A good finish can be achieved only if the sanding process is followed correctly.

Coated abrasive components

There are three main components in a coated abrasive. These are:

• _________________

• _________________

• _________________
Backings

There are three main types of backing used. These are:

• 
• 
• 

Reflection

What backings are used on the abrasive that you use at your workplace? Are machine-based backings different from general-purpose hand sanding paper? If so, why do you think this is the case?

Paper backings

Paper backings are classified with ________________ that reflect the weight of the paper measured in grams per square metre, for example:

• ‘A’ weight – 60 g per square metre – this is a lightweight flexible paper backing through which the operator can feel __________________________. It is used generally with finer grades of abrasive for fine finishing.

• ‘C’ and ‘D’ weight – 120 g and 153 g per square metre respectively – these much stronger papers are best used with coarser grades of abrasive for where __________________________.

• ‘E’ weight – 220 g per square metre – this is the strongest of the types of paper backing but lacks flexibility. The superior strength of this paper makes it most suitable for __________________________ sanding machines.
Cloth backings

Cloth backings are made of cotton yarns, which are treated to improve their strength and flexibility. The two most common weight backings are:

• ‘X’ weight – a durable and strong backing material that will withstand ______________ activity.

• ‘J’ weight – a more flexible cloth used on ______________, ______________ and ______________ surfaces.

Fibre backings

Fibre backings often have a combination of cloth and paper in vulcanised fibre. This is to combine the benefits of strength and flexibility into a backing that will then be suitable for specific applications. They are very hard, strong and flexible, and are produced in a number of ______________.

They are generally produced specifically for ______________ and ______________ requirements.

Adhesives

There are two types of adhesives used to bond particles to the backing materials. These are:

• animal glue – cost-effective but suitable only for ______________

• synthetic resins (phenolic and urea formaldehyde) – suitable for ______________ or ______________ sanding, and particularly suitable where a greater amount of heat is anticipated.
Prepare Surfaces for Finishing

Abrasives grits

There are two distinct categories of abrasive grit available. These are:

• ________________ – mined from the ground and used in their natural state after crushing

• ________________ – produced by fusing one or more natural elements with heat until a solid mass is created and then crushed.

Natural abrasive grits

Flint is a relatively inexpensive natural ________________________. It is no longer used as an abrasive because it does not hold its edge for very long.

Emery is a ________________________ natural abrasive used for light polishing jobs. It can be used ________________________ or ________________________. It is used mainly for polishing metal.

Garnet is a reddish brown stone that is mined as much for ________________________ as for abrasives. As an abrasive it is only available in a ________________________ ________________________. It is therefore suitable for ________________________ activity only.

Crocus is a natural material made of ________________________ ________________________. It is used mainly for polishing metal.

Artificial abrasive grits

Aluminium oxide is made from ________________________ mixed with ground coke and iron filings before being burnt for 15–25 hours at 2000°C. It is grey or brown and is available with ________________________ or ________________________ backings. It is suitable for hand sanding and machine sanding of both softwood and hardwood, as well as metal surfaces and plastics.
**Silicon carbide** is a fusion of silica-sand and coke at 2600°C. It is a ________________ abrasive that is especially suitable for ________________. It can be used with water or oil and is particularly suitable for ________________ on timber.

**Glass** is a fusion of silica-sand, lime and other ingredients. Glass is no longer used as an abrasive because it has very poor staying qualities.

**Discussion**

Which abrasive paper is the best? Why? Is it possible that they all are because some papers are more suited to a particular task than others?

**How are abrasive papers graded?**

There are three common measures used for grading abrasive papers. These are:

- grit numbering
- symbol numbering
- simplified markings.

**Grit numbering** is the most ________________ of how large the grit particles are. Grit numbering identifies 15 grit particle sizes ranging from 50 to 600. The number refers to the number of ________________ in a 25 mm section of wire mesh through which the particles are sifted and sorted for bonding to a backing.

**Symbol numbering** ranges from 9/0 to 1. This system identifies only 10 of the 15 grit particle sizes. The numbers refer to the ________________ of the abrasive, with 1 being the coarsest and 9/0 being the ________________ grit bonded to a backing.
**Simplified marking** is not very accurate at all. It is suitable mainly for ____________________. The markings are:

- very fine ____________________ grit
- fine ____________________ grit
- medium ____________________ grit
- coarse ____________________ grit
- very coarse ____________________ grit.

**Abrasive grit structure**

Coated abrasives are available in two forms. **Open coat** abrasives are identified by the ____________________ on the sheet. They are applied ____________________ so that the sheet does not generate too much ____________________ during operation.

![Fig 3.1 Open coat abrasives](image)

Open coat abrasives are particularly useful on ____________________ because lots of space between particles assists in preventing the abrasive sheet from ____________________ during use.

**Closed coat** abrasives are identified by the ____________________ on the sheet. They are applied tightly to provide ____________________ with ____________________.
Closed coat abrasives are particularly useful in ________________
because lots of grit minimises the ________________ to carry out the
cleaning up process.
Section 4 – Student assignment

Practical Task

1. You are required to obtain six samples of coated abrasives, each approximately 50 mm × 50 mm in size.

2. Fix them to the following pages and explain the characteristics of the samples you acquired in the following terms:
   - grit type
   - grit size
   - backing material
   - uses, e.g., wet or dry, rough or fine work, woodwork or polishing, etc.

Present your completed sample characteristics to your lecturer/trainer for marking.

Fig 4.1 Coated abrasives
Example

Grit  Non-woven fabric impregnated with aluminium oxide or silicon carbide to assist with abrasion. The grit grading is determined by the coarseness of the grit applied, which may vary from 80 grit to 400 grit and is colour-coded to indicate coarseness.

Coat  No coating is applied to the non-woven fabric.

Backing  This backing is neither fabric nor paper. It is in fact a plastic polymer.

Uses  This abrasive has a large range of uses from general-purpose sanding through to extremely fine sanding between finish coats in the polish shop. The pads are manufactured in a range of sizes suitable for hand sanding application as well as power sander finishing and even heavy duty machine sanding.

Abrasive samples

<table>
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<tr>
<th>Sample</th>
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<table>
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<table>
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<tr>
<th>Coat</th>
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<table>
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<tr>
<th>Backing</th>
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<tr>
<td>Coat</td>
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<tr>
<td>Backing</td>
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<tr>
<td>Uses</td>
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Sample

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<td>Coat</td>
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<td>Backing</td>
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<td>Uses</td>
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## Prepare Surfaces for Finishing

### Sample

<table>
<thead>
<tr>
<th>Grit</th>
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<table>
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<tr>
<th>Coat</th>
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DESCRIPTION
This learner’s guide has been developed to assist in the delivery of Certificate I, II and III in furniture-making and cabinet-making qualifications within the furnishing training package. It contains information and activities that cover the types of joints, properties and characteristics of adhesives, capabilities and limitations of tools, choice of adhesives and workflow in the workplace.

EDITION
Second edition

CATEGORY
Building and Construction

RELATED PRODUCTS
BC2012 Work Safely in the Furniture-Making Industry
BC2013 Join Solid Timber
BC2014 In the Workshop
BC2015 Use Furniture-Making-Sector Hand Tools and Power Tools
BC2017 Apply Sheet Laminates by Hand
BC2019 Hand Make Timber Joints