Processes – Finishing

Preparation
When considering what finish to use think about how glossy you would like the piece to look.

High Gloss is a very shiny, mirror like finish. Gloss is similar to high gloss but not quite as shiny. Satin has a flattening agent mixed in to limit the reflection of light compared to a gloss finish, producing a relatively dull surface. Matt has more flattening agent added than satin and produces a very dull surface finish with practically no reflection of light.

The greater the level of gloss in the finish the more defects will be seen when light is reflected off the finished surface. A high level gloss will also highlight features of the timber to the greatest advantage.

The initial part of preparing a job for finishing is stopping and sanding

Filling or Stopping
Nail and other holes should be filled before applying a finish to a job. Generally we should be very careful and use methods of construction that do not result in holes showing in the job, but if it is not possible to make a piece any other way then there are a wide variety of stopping materials or putties that can be used.

For small holes the following materials can be used to fill them:

- Wax sticks - are available in a wide variety of colours to suit almost any timber
- Plastic Wood - is also available in a wide range of colours but the hole must be over filled when using to allow for shrinkage
- Water Based Putty - is widely available in a range of colours to suit a variety of timbers. Is easy to use and clean up

For larger holes the following materials should be considered:

- Oil Based Putty - needs to be left to dry for a longer period of time than water based putty and is more difficult to clean up

- Fibre Glass - is a new innovation in stopping. It dries very hard very quickly

Other fillers can be used such as an epoxy resin coloured with a pigment or sawdust. The saw dust filler is not usually used where it will be highly visible because the colour will never be as good a match as it would be if a proper filler was used. It is also very important to make sure that no air bubbles are present in the epoxy resin mixture because when it is sanded back the surface left might have spherical holes left from where the air bubbles were.

Staining

Staining is used to colour timber or emphasise the natural grain. Colouring timber can be done to match existing pieces of furniture or because you want a usually cheaper timber to resemble a more expensive timber.

Stains are available in oil or water based varieties. No matter what you choose you should always test the stain on an offcut from the project. If you apply it to your job and decide you don't like how it looks it is too late to go back. The finish should also be applied to the test piece to show the final colour of the stain. If you use a water based stain you should also use a water based finish. Use an oil based finish with an oil based stain. Water and oil do not mix well together.

Any surface defects need to be filled and the surface smooth and brushed or wiped clean. A coat of sanding sealer should generally be applied before staining to help achieve an even colour.

The stain should be applied according to the manufacturer's instructions. Some need to be brushed on with the grain, some can be sprayed on, some wiped on with a cloth either with the grain or in a circular motion. The excess may need to be removed after a specific period of time.

Overlapping sections need to be handled carefully as applying multiple coats of stain can increase the intensity of the colour and you don't want adjoining panels to have a darker strip where they meet.

The finish is applied over the stain, although some finishes can have the stain premixed into it, allowing you to stain and finish at the same time.

Oils
Oils are a quick and easy method of applying a finish. They are much less durable than other finishes such as polyurethanes and lacquers as they don't usually form a hard surface that protects the timber. They do penetrate into the timber and provide a slight sheen. Oil finishes are usually wiped on with a cloth.

Typical oil finishes include Scandinavian Oil, Tung Oil, and Linseed Oil.

An old saying for the application of an oil finish says to apply the oil once a day for a week, once a week for a month, once a month for a year and the once a year after that.

The exception to the rule of oils that don't form a hard surface layer is Tung Oil. It will form a hard surface and provide a higher gloss than other oils, while still highlighting the figure of the timber like other oils.

A common finish for timber products that will be used for food storage is Vegetable or Grapeseed Oil. These are food safe and easily applied but do need to be wiped on regularly.

Water & oil based finishes
The main differences between oil and water based finished, besides what they are based on, is the clarity and durability of the finish. A water based finish will generally be clearer when applied to the timber, where an oil based finish typically has a slightly yellow tinge to it. However, the durability of oil based finishes is considered to be superior to water based finishes. This is especially the case with two part oil based finishes like polyurethanes. Water based finishes are also thinner than oil based and require more coats to build a thicker finish.

Oil based finishes include Nitro-Cellulose Lacquer, Polyurethane

Water based finishes include Polyurethane and Acrylic.

Shellac
Shellac is a natural product. It is derived from a resin that is secreted from the Lac beetle of Southeast Asia. This insect secretion is scraped from the bark of trees and, when processed, takes the form of small, light-brown or orange flakes. To turn it into a usable liquid finish the flakes are dissolved in

Methylated Spirits. The finish is available in a range of tints ranging from blonde to orange.

Shellac is a very easy finish to apply. It can be brushed on or ‘padded’. It is also very easy to repair if it becomes damaged. A cloth soaked with Methylated Spirits is used to wipe off the old finish and a new coat of Shellac is applied.

Brushing Shellac on is very straight forward. ‘Padding’ involves using a clean cotton rag surrounding a cotton pad and moistening it with Shellac. The ‘padding’ is then used to apply the Shellac in long, consistent strokes. More Shellac is applied to the cotton padding as needed, but it should not be dripping off.

French Polish

French Polish is the process of applying many thin coats of Shellac to create a highly glossed surface finish. The finish is delicate compared to other finishes such as polyurethane. It is easily damaged by contact with liquids but is easily repaired.

The process applies extremely thin layers of Shellac, working in a circular motion with firm pressure. Because the layers are so thin a number of thin layers can be applied in one session. The overall time required to build up the finish on one surface can take hours and up to 8 sessions.

When each layer has dried a small amount of Methylated Spirits is loaded into the centre pad and the cotton then wiped over the surface in long, consistent strokes to remove any oil that has risen to the surface of the finish. The next layer cannot be applied until this has been done.

When you have finished applying all of the layers it is important to inspect the piece at all angles. Move it around in the light to detect any blemishes. If any are found they need to be removed by very light sanding with 1200-2000 grit went and dry paper, then light rubbing with the pad loaded with Methylated Spirits. The layers will then need to be reapplied.

Once all of the layers are done the French Polish is finished, however you can continue to add more layers of Shellac to deepen the finish.

Spray Finishing – Industrial Process

In the classroom, most spray finishing will be done using aerosol cans or with the aid of an air compressor.

Using an aerosol can is as simple as point and spray, as long as the correct preparation methods have been observed. This can be an effective method for finishing smaller jobs.

Using an air compressor and spray gun requires some more setting up but will generally give a much better finish quality than the aerosol cans. The spray gun is either a low-pressure type or a high-pressure type. Using a low pressure spray gun means that the finish being sprayed does not need to be thinned down as much as it would with a high pressure spray, so thicker coats can be applied, wastage is reduced but the chance of sagging is increased. Different size nozzles are available for the spray guns depending on what is being sprayed. The typical spray gun used in the school workshop have a transfer efficiency (how much finish stays on the job) of about 45%.

When spray finishing it should always be done in a confined, draughtless room; preferably a spray booth with an electrostatically charged screen or water wall to attract overspray. The job should be supported on a table that allows for 360° rotation so the whole job can be sprayed in one session. The spraying should begin before the gun is aimed at the job and finish when the gun has gone past the job to ensure that an even coat is applied to the whole piece. The gun should be moved along in a line parallel to the surface being sprayed, not in an arc from the one position.

Any spray job should be prepared in the same way as for the application of a brushed finish. Sanding sealer should be applied to open grained timber before spraying for the best results, particularly if a high gloss finish is desired.

The spray gun should be cleaned after any use. When cleaning the cup is removed and the remaining finish sprayed out. The cup is filled with the appropriate solvent and sprayed through the gun to clean out any finish liquid left over. The nozzle is also cleaned with the solvent after use so that it does not clog up.

Surface coating materials that can be sprayed include: Shellac, Nitro-cellulose Lacquer, Sanding Sealer, Stains, Polyurethane, Enamels and Acrylics.

Nitro-cellulose lacquers dry very quickly through the evaporation of solvents, so it is important to use a correctly set up spray booth. Nitro-cellulose lacquers are generally thinned by 50% with lacquer thinners when sprayed. It produces a satin to glossy sheen and durable surface.

Two part polyurethane consists of a filler material and a hardener. It cures through a chemical reaction between the two parts and must be carefully mixed in the correct ratios. Two part polyurethane produces a resilient finish.

Hand Finishing

Finishes that can be applies by hand include oils, stains, polyurethane, waxes, paints, shellac, etc. These finishes can sometimes be used in conjunction with other finishes.

Probably the easiest finish to apply to a project is a shellac and Scandinavian teak oil finish. Shellac is an organic material derived from the Lac Beetle. This is done by brushing on the shellac (orange shellac for medium coloured timber, white for light timber and button shellac for darker timbers) in fine coats and sanding with 400 or 600 wet and dry paper between coats. About three to five coats are needed. The Scandinavian teak oil is then applied with a piece of steel wool in a fine grade such as 00. The oil is applied lightly and any excess oil is wiped off before it becomes tacky using a clean, dry cloth. The brush used with the shellac should be washed in methylated spirits.

Shellac is also used to produce a French Polish. This is a very time consuming finish to produce but is very rewarding in that it will leave a highly glossy, mirror like finish. It is not very durable and needs to be reapplied every so often. It is initially applied using a mop type brush and then a ‘rubber’. The rubber is made up of a lint free cloth wrapped around an absorbent centre.

Polyurethane, when applied by hand, is best done in a matt or satin finish. It is very difficult to get a good finish using gloss polyurethane and this is best sprayed. A matt polyurethane will typically dry faster than a satin polyurethane so the first and even second coat can be done in matt and then

finished with a coat of satin to achieve a good result. Any brushes used with polyurethane should be washed out in mineral turpentine.

Waxes work best when applied to a closed grained timber or when finishing turned jobs while on the lathe. While the lathe is going the wax should be rubbed in. The danger in applying wax this way is that it may burn and leave ugly marks on the project. The best defense against this is not to press too hard.

Common Faults in Finishes

Some of the common faults and blemishes in finishes include:

- Machine Marks - these are wavy or corrugated marks caused by machinery such as the thicknesser. They should be removed using a scraper or plane. Sanding will not remove the marks properly
- Bruises - this is caused by dropping a blunt object onto the surface. Bruises or dents can be removed by placing a damp cloth over the area and then applying a hot iron to the cloth. This will cause the timber to swell. The area then needs to be sanded
- Scratches - can be caused by dragging a sharp object across the surface. These marks need to be removed by sanding or scraping with the grain
- Holes - can be found due to nails, loose knots, tear out from a machine, insects and broken edges. Holes need to be filled with a stop, scraped or have the material glued back into place
- Grease - these stains usually occur when using hand tools, power tools and machinery. The stained area should be cleaned with mineral turpentine and then sanded
- Glue Marks - these marks occur when the assembler uses excess adhesive and is careless in their cleaning up after assembly. The excess adhesive needs to be removed using a damp cloth while wet or with a sharp chisel or scraper after it has dried
- Cross-Sanding - shows as a number of fine scratches across the grain of the timber caused by the incorrect use of abrasive paper. The marks left from cross sanding need to be sanded or scraped away moving with the grain of the timber
- Burn Marks - this happens when using blunt cutters or slow feed rates, particularly on internal corners. These marks need to be sanded away or scraped going in the direction of the grain

Environmental Issues Associated with Finishing

Most environmental issues associated with finishing relate to the disposal of finishes. This includes not only the liquid finish that is left over from a project, but also the cleaning of finishing equipment like brushes and spray guns, as well as overspray during the finishing process and any fumes created.

Left over materials are able to be stored in air tight containers for future use. If they are not going to be used it is best to let them go hard so they can be disposed of. Pouring a finish down a sink or into a waterway is never an appropriate method of disposal. The same is true for cleaning equipment. Equipment should be cleaned in a dedicated cleaning area, not in a sink.

Fumes and overspray created during the process of spray finishing should be contained by the extraction system attached to the spray booth where the finish is being applied.

Review Questions – Timber Finishing

1. Write the steps that are necessary before applying a sprayed finish.

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2. List the steps taken to apply a sprayed finish.

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3. What solvents are used to clean:
   Shellac:…….

   Lacquer:……

   Estapol:…….

   Polyurethane:……....

4. Describe the process for applying a stain.

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5. What are the differences between oil and water based stains?

Oil Based Stains	**Water Based Stains**

6. What are the differences between oil and water based polyurethane?

Oil Based Polyurethane	Water Based Polyurethane

7. How is a two-part polyurethane different to single part polyurethane?

Two Part Polyurethane	One Part Polyurethane

8. Describe the characteristics of these finishes:
   High Gloss:……
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   Satin:…….
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   Matt: ……..
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   Gloss: ……
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9. Why do we use stains?

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10. List the various timber stops that can be used and describe their characteristics.

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11.How do you identify and correct the following faults?

Bruises:……
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Machine Marks: ……
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Scratches: ……
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Grease: ……
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Holes: ……
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Cross Sanding Marks: ……
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Glue Marks: ……
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Burn Marks: ……
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