Veneers

By Michael Doherty

Manufacturing Techniques

There are several ways to manufacture veneers. The techniques can be categorised into the following:

- peeled
- sliced, or
- sawn.

Peeled Veneer

Peeled veneer is produced by rotating a round log and using a shape blade to slice the veneer. This veneer is parallel to the grain. It is generally of poor quality.

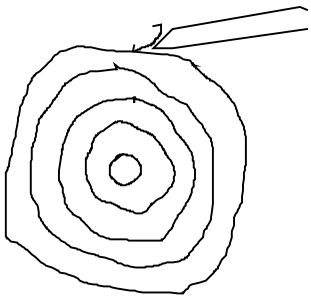
Before being peeled, the log is boiled and steamed to soften the timber fibres.

Sliced Veneer

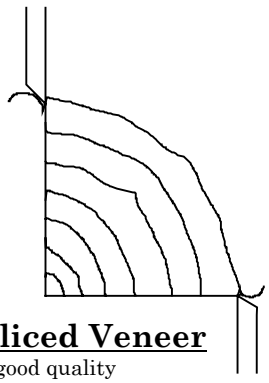
This technique involves cutting the veneers off quarter cut logs which are boiled to soften the timber fibres. The veneer can be:

- sliced perpendicular to the grain, or
- cut radially by rotating the log.

Diagrams



Peeled Veneer
* poor quality



Sliced Veneer
* good quality

Sawn Veneer

Sawn veneer is re-sawn using a bandsaw to make thin veneers (around 2-3mm). This was the traditional method for producing until the peeled and slicing techniques were introduced.

Sawn veneer is alive

Sawn veneer is not a true veneer in that it retains the properties of timber in that it swells whereas sliced or peeled veneers are distressed or 'dead' That is, when glued down sliced or peeled veneers tend to be stable whereas sawn veneers will continue to shrink and swell with changes in moisture content.

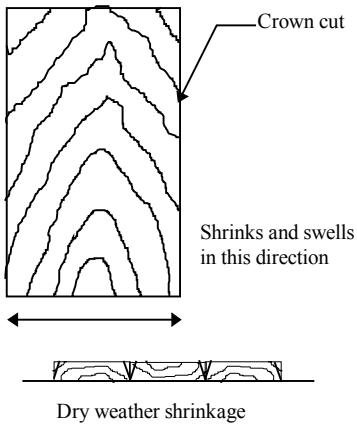
Controlling Shrinkage & Swelling in Wood

Timber will swell and shrink

Wood is made up of numerous cells which transport water up and down the tree. When seasoned, the water is evaporated from these cells. As a result the timber will shrink as the water evaporates. Changes in humidity can cause the timber to swell and shrink as the moisture content in the timber changes.

We cannot prevent this, however, we can learn to control the effects.

Cross grain shrinkage



The majority of movement will be across the grain and can be up to 1/8 to 1/15 of the width. When designing furniture allow for this movement across the grain.

As previously stated, sawn veneers will continue to shrink and swell after being glued down as shown.

Hint: Cut thin sawn veneers, plane . and sand to about 1mm to minimise the effect of swelling and or shrinking cracks.

Maintaining moisture content

Store veneer pieces in a plastic bag or container with a saucepan to maintain the moisture content as close to 100% humidity as possible. When finally glued down, sliced or peeled veneer will be stable.

Making drawers

When making drawers, allow 3mm for shrinkage across the grain. Drawers made in Canberra dry climate will swell when taken to a humid climate like Sydney.

Oysters Veneers

Oyster veneers are decorative veneers sawn cut across the grain from the end of logs. Being cut from round logs, oysters are likely to crack due to the drying out of the short grain fibres and the subsequent shrinkage. There is no way to prevent the shrinkage, however, it could be controlled by making saw cut to the centre of the oyster and sealing both side with shellac. After drying, this cut could expand up to around 30°.

When dry, sand end grain with a coarse sand paper 80 grit and work your way down to finer grades.

Preparing Veneers

Staining veneers

Soak veneer in the stain to ensure that the stain is consistent throughout the depth of the veneer so that sanding will not change the colour of the stain.

Hairwood is a stained using a traditional technique to stain sycamore veneer green/grey.

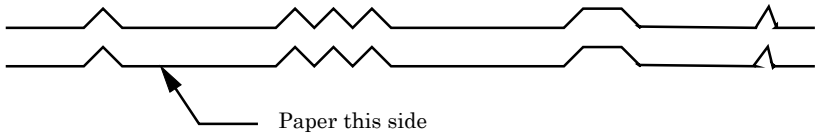
Backing Paper

Always use backing paper to stiffen and reinforce veneers. Stiff brown paper or 'lay out' paper are good backing paper.

Fix to veneer with white PVA glue.

Fixed backing on 'bottom' side

There is a 'top' and a 'bottom' side to peeled or sliced veneers. When veneer is cut, the grain fibres split apart causing the grain fibres to protrude on one side with grapes on the reverse (or 'bottom') side. Ensure that the paper is fixed to the 'bottom' of the veneer. This ensures that when the veneer is sanded there is plenty of wood remaining after the protrusions are sanded off. Conversely, if the backing is applied to the other side, there will be minimal thickness when veneer is sanded.



Glues

The types of glues which are using in inlay and marquetry are:

Glue	Notes
Yellow PVA (UV 180) White PVA	OK but can move under pressure and can swell veneers
Urea formaldehyde	excellent resin based glue, strong but toxic.
5 minute epoxy (araldite)	excellent glue. Epoxy resins can be coloured by mixing powders.
super glue / 'hot stuff'	excellent. 'Hot stuff' comes in three consistencies and can be used as a filler.
Japanese rice glue	starch based, can be mixed with saw dust as a filler
Spray contact	used to fix paper papers to veneer

Notes on glues

Most glues will leave a black glue line when dry. **Hint:** Use yellow PVA glue which leaves a yellow line.

Don't use a light timber inlay on a light/white coloured mother wood. Use darker inlay on lighter mother wood to hide dark glue line.

Tools and Techniques

Useful tools

The tools used in inlay and marquetry are generally inexpensive and a basic kit can produce good results. Some of the tools can be improvised or home made. The main tools in the kit are:

- Marking tools
  - Hard pencils (2H or 4H)
  - needle in pin vice
- Cutting Tools - knives:
  - No 3 cutting knife,
  - cutting mat,
  - sandpaper schmick sticks
- Cutting tools - sawing
  - fine jeweller's piecing saw,
  - fine blades,
  - Bench Pin
  - scroll saw (optional)
- inlay tools
  - small gouges
  - hand router
  - electric router (optional)

Knives

A good quality and well sharpen No 3 knife is excellent.

Warning: Scalpel blade use hard brittle steel in thin blades which can snap under use sending splinters in all directions. Watch the eyes!.

Markers

Tools to mark the shape of the inlay onto the mother wood include:

- Dentist's scrapers
- needle in a pin vice
- stylist (metal working)

For best results sharpen edges.

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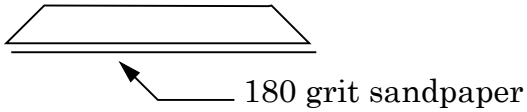
Tools and Techniques, Continued

'Schmick' sticks

'Schmick' sticks are small sticks with 180 grit sandpaper glued to one side. The long sides of the stick are chamfered on the edges to allow stick to get into tight areas. Approximate dimensions are 150mm long, 12mm wide by 5mm thick.



The method to prepare 'schmick' stick from 12mm timber is:

Step	Action
1	Select a knot free piece of timber approximately 150x90x12mm.
2	Using a router table and 45° chamfering bit, set the fence so that a 3mm mitre will be cut.
3	Chamfer both long edges. Turn over and chamfer other end.
4	Set fence on the bandsaw (or improvise your own) for a 5mm cut.
5	Cut the 'schmick' stick from both edges
6	Spray glue sandpaper (180 grit) to the flat side of stick
7	Repeat Steps 3-6. Stop When the width of timber is 50mm.

Round 'schmick' sticks

Round 'schmick' sticks constructed from dowel are useful for sanding round shapes. Several diameters of 'schmick' stick are useful, say 6, 8, 10 & 12mm. The method for making round 'schmick' sticks is:

Step	Action
1	Cut sand paper into thin strips, say 10-15mm wide
2	Lightly spray dowel and back of sandpaper (180 grit)
3	Starting at the top, wrap sand paper around dowel in tight spirals along the full length of the dowel. Ensure that there are no gaps between the spiral edges.
4	Secure with a rubber band and along to dry
5	Trim excess sandpaper off ends before using.

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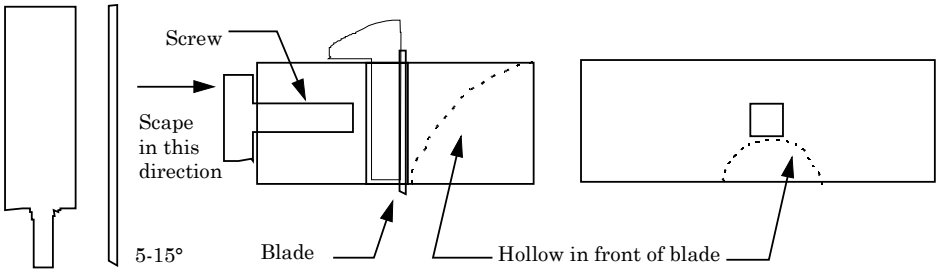
Tools and Techniques, Continued

Hand Router

A Hand Router is used to cut the hollow into the 'mother wood' for the inlay. It is constructed from an old high speed steel jigsaw blade and a piece of flat hardwood.



Blade **Elevation** **Plan**

To set the depth, loosen the screw, and press the blade down. Place the inlay on a flat table then the router. Allow the blade to push up. Tighten the screw.

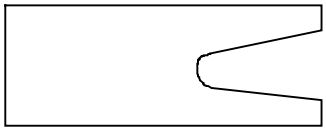
When using take small cuts towards you.

To sharpen.

Step	Action
1.	Loosen the screw and set the blade until the bevel is flat on the stone.
2.	When flat, tight screw and drag the router towards you riding on the point and rear edge. Repeat until sharp.
3.	Remove the burr before using.

Bench Pin

The Bench Pin is used to support small pieces of timber whilst being sawn. It can be constructed from a piece of hardwood such as Jarrah. The board should be about 200x70x6mm. A 12mm hole is cut on the centre line some 70mm from one end. A triangular wedge is then cut out. Make a template off your first board, as they can be easily damaged when cutting veneer.



Bench Pin

Scrapers

Types of Scrapers

Two types of scrapers which can be used are:

- glass scraper, and
- metal cabinet scraper.

Glass Scraper

A useful and cheap scraping technique is to use scrap glass from a picture framer. Take along a pair of leather gloves and ask if you can rummage through the scrap bin. Select the best 2mm glass.

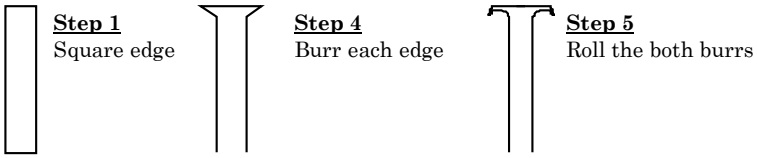
The technique for making a glass scraper is:

Step	Action
1.	Select a piece of 2mm glass about 100mm wide.
2.	Lubricate a glass cutter with kerosene and make a single curved cut across the glass. **Note:** Do not attempt to make a second cut along the groove as this will damage the cutter.
3.	Grasping the glass with both hands across the scratch mark and snap.
4.	Use the bottom side, not the side scratch by the cutter, to scrap with.
5.	Scrap away from you. Discard when blunt.

Cabinet Scraper

The metal cabinet scraper is a simple but an effective finishing tool. The scraper works by cutting with a burr on the edge of the scraper. A well sharpen scraper has two cutting edges. The method to sharpen a cabinet scraper is:

Step	Action
1.	With a coarse file, remove the burrs from both sides by filing flat against file.
2.	Hold scraper perpendicular to file and square the edge.
3.	Repeat Steps 1-2 on a fine sharpening stone.
4.	Place the scraper in a vice.
5.	Burr the edge by running the round part of a screw driver along the edge. Do this twice and repeat for other edge.
6.	Roll the burr by running the screw driver in a single stroke at an angle to the edge. Repeat for the other side.



Cutting Inlays

Outline Process

Cutting inlays consists of the following stages:

Stage	Description
1	Preparing inlay pattern
2	Transferring pattern to veneer
3	Cutting the inlay
4	Marking the inlay shape onto the 'mother wood'.
5	Hollowing out the mother wood for inlay.
6	Inserting the inlay into the mother wood.

The methods for each stage is detailed below. For some stages there are several methods for achieving the same result.

Stage 1 - Preparing inlay patterns

Draw the patterns at a large scale and photocopy at reduced scale to the appropriate size. The benefit of this technique is that the lines become finer as the pattern is reduced in size.

Stage 2 - Transferring pattern to veneer

Use spray glue to fix pattern to veneer. Lightly spray the back of the paper and wait until tacky. Fix to veneer.

Do not use water based glues as it swells and distorts the paper.
Do not draw on wood.
Do not use carbon paper.

Hints: Use a transparent pattern paper such as transparent drawing film, grease proof paper or tracing paper, to reveal the wood grain. This is useful for including decorative features such as 'birds eye' or knots.

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Cutting Inlays, Continued

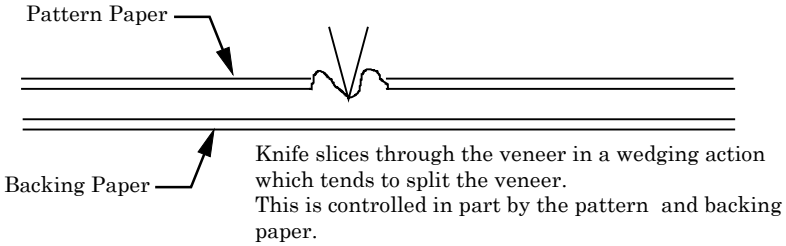
Stage 3 - Cutting the inlay

There are two methods for cutting the inlay depending on the type of veneer. These are:

- knife cutting for sliced or peeled veneer, and
- sawing for sawn or thick veneers.

Knife Cutting Veneer Inlay

Use multiple, shallow cuts to cut veneer. Do not attempt to cut through the veneer in one pass as it will tend to tear and leave an ugly edge.



Step	Action
1.	Place veneer onto a cutting mat.
2.	Lightly score through the paper and groove the veneer, say about 1/3 the depth.
3.	Follow the score line and deepen the cut. If necessary, make a relieving cut to remove a wedge of veneer on the waste side. **Note:** Cut away from corners.  Repeat until fully cut through.
4.	Clean up edges with the 'schmick' stick. Slightly bevel edges. **Note:** The bevel allows ensures a tight fit when the inlay is placed into the mother wood.

Saw Cutting Veneer

The piecing or scroll saw is used to cut thicker veneer.

Note: When selecting blade for the saw ensure that there will be at least 1½ teeth are in the thickness of the veneer when cutting. Use coarser rather than finer blades when starting.

Step	Action
1	Clamp a 'V' board to the edge of the table.
2	Place the veneer onto the 'V' board and hold down with thumb.
3	Holding the piecing saw in the opposite hand, use slow vertical strokes to cut the veneer.

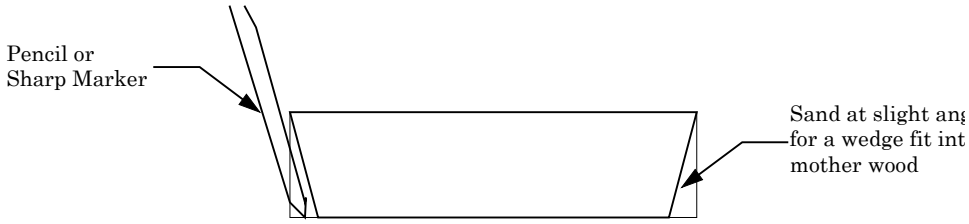
Stage 4 - Marking the mother wood

Two techniques for marking the shape of the inlay onto the mother wood are tracing the outline with a:

- sharp pencil, or
- sharp marker such as a needle or stylist.

The techniques are similar.

Step	Action
1.	Lightly adhere inlay to mother wood with a drop of yellow glue on corners.
2.	If using a pencil: • Select a sharp 2H or 4H pencil. • Holding pencil at a slight angle, rest the pencil point against the bevel and trace the outline. If using a sharp marker • Insert a dress makers needle into a pin vice. • Holding needle at a slight angle, rest the point against the bevel • Lightly score around inlay using multiple passes to mark the inlay shape. Keep needle at a low angle to get a clean score mark.
3.	Remove inlay from mother wood by using inserting a small putty knife under the inlay. Be careful not to damage the inlay.



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Cutting Inlays, Continued

Step 5 - Hollowing out mother wood

Three techniques for hollowing out the mother wood are:

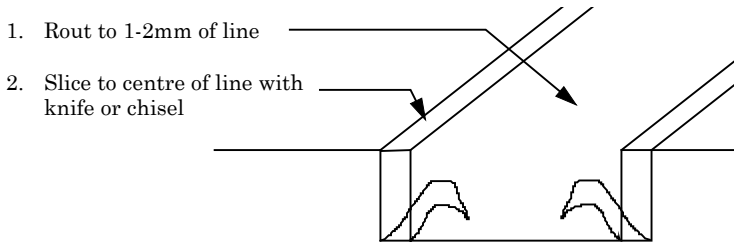
- using a hand router, then cutting to line,
- knife cutting the outline, then using a hand router, and
- small gouges.

Any of the methods will work, although the second method is safer in that there is a clearly defined edge cut into the mother wood.

If using an electric router follow the instructions for using the hand router.

Routing then cutting

The technique for using a hand router, then cutting the outline shape is:

Step	Action
1.	Set the depth of inlay on the hand router.
2.	Use the hand router to remove the waste down to the required depth to within 1-2mm of the line. Taking small cuts, make a trench in the mother wood at the required depth. With small strokes scrape waste into the trench until the required depth is achieved all over. 
3.	With a knife, slice in the centre of the score mark.
4.	Clean up with sharp knife or No 2 3mm bent to ensure all side are perpendicular. **Note:** A score cut with the below the final depth of trench allows some relief for glue when inserting the inlay.

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Cutting Inlays, Continued

Cutting outline then routing

The technique for cutting the outline than routing is:

Step	Action
1.	Use a knife to cut in the centre of the score mark.
2.	When the knife cut becomes too deep, use the knife at an angle to cut a relieving sliver of waste wood. Ensure the sliver is cut on the waste side. Repeat until approximate depth of inlay is reached.
3.	Use the hand router to remove the waste down to the required depth. Taking small cuts, make a trench in the mother wood at the required depth. With small strokes scrape waste into the trench until the required depth is achieved all over.
4.	Clean up with sharp knife to ensure all side are perpendicular.

Hollowing out with gouges

The technique for hollowing out the mother wood with small gouges is:

Step	Action
1.	Use a knife to cut in the centre of the score mark.
2.	When the knife cut becomes too deep, use the knife at an angle to cut a relieving sliver of waste wood. Ensure the sliver is cut on the waste side.
3.	Use a small gouge (or veining tool) to gouge out a full length of the inlay. Repeat with small overlapping cuts.
4.	Use a knife to cut at 90° around the edges. Angle cut to remove the wedge.
5.	Continue knife around edge deeper than cut. Repeat Steps 5-8 until depth reached.
6.	Finish up with hand router.

Gouge to use

2mm No 7, 8 or 9 gouge. Also could use a 2mm No 11 veining tool.

Alternate Methods

Scrapping with a small No 2 Bent and cleaning up with a small No 2 gouge.

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Cutting Inlays, Continued

Step 6 - Inserting Inlay

The final stage is to insert the inlay into the mother wood as follows:

Step	Action
1.	Ensure corners of hollow and inlay are clean.
2.	Apply glue evenly to the hollow in the mother wood and to the back of the inlay. **Note:** There is no need to remove the backing paper.
3.	Insert the inlay and allow glue to run.
4.	Press down with a block (covered with packing tape to avoid being stuck by the glue). Clean off surplus glue. **Note:** Do not use a piece of paper between inlay and pressing block.
5.	With a clamp, tighten in stages with light pressure to allow the glue to run.. Do not over tighten.
6.	Leave over night and allow glue to harden.
7.	Remove clamp and pressing block.
8.	Lightly sand or scrap until the inlay is flush with the mother wood.

Inlaying hard veneers

When inlaying hard veneers (such as metal, silver, mother of pearl etc), inlay them to below the surface of the mother wood. Use a hard rigid block to sand over the hard inlay. A soft sanding block, such as cork, could deform allowing the inlay to be damaged.

Scraping

When scraping an open gained timber veneer (such as blackwood) scrap with the grain not against it. Scraping against the gain could remove timber fibres and leave voids.

A technique to prevent this is to scrape at 45° to the grain.

What if there are gaps?

If there gaps between the inlay and the mother wood all is not lost. Techniques include:

- Japanese rice glue and sawdust as a filler.
- Alternatively, if using fine buffing oil, work up a slurry with a fine sand paper 400 grade and let the slurry fill the gap. Allow to go tacky before rubbing off. If too tacky, apply small amount of buffing oil to rag and rub off.
- A thick coating of Shellac rubbed into the gap.

Marquetry

Similar to inlay

The techniques used in Marquetry are similar to that used in inlay. In fact, marquetry means 'onlay'.

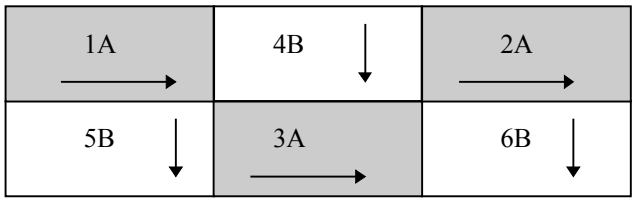
The outline process for producing marquetry panels is:

Stage	Description
1.	Preparing the design, pattern and selecting veneers
2.	Cutting out the paper pattern and individual veneer pieces
3.	Tape pieces onto master pattern
4.	Glue marquetry panel into position

Stage 1 - Preparing the Design

This is a crucial stage in the process in which the veneers are matched to the veneers. It is important to note the direction of the grain onto the pattern.

The detailed process is:

Step	Action
1.	Make at least four (4) copies of the design: • Master • Cutting • Assembly • Spare
2.	Examine the pattern and select the veneer and grain direction which best suits the design.
3.	Number each piece on the Master Pattern and mark the grain direction. **Hint:** Number all pieces on the same veneer consecutively and label with a number to represent the type of veneer. eg 1A
	eg:  A = dark veneer B = light veneer

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Stage 2 - Cutting Out Pattern

Each of the pieces is the pattern need to be cut out cleanly so that when reassembled, there is no gaps between the pieces.

Step	Action
1.	Cut out each piece from the paper pattern. **Hint:** To assist with reassembly, tape the pattern onto the board the marquetry panel is to be fixed to. As each piece is cut, the knife scores the pattern into the surface. These score marks can be used to locate the pieces during reassembly.
2.	Identify the appropriate veneer and grain direction before spray gluing pattern to veneer.
3.	Cut out each veneer piece and clean up using schmick stick. **Hint:** Rest knife against the paper pattern and use as a guide when cutting.

Stage 3 - Assembling Pieces

Although shown as a separate stage, each piece should be progressively assembled so as to avoid loosing small pieces.

Step	Action
1.	Identify piece and position on assembly pattern.
2.	Locate and position a neighbouring piece. Use schmick stick or knife to clean up edges.
3.	Using 'magic' sticky tape, stick the pieces into position. Drops of Yellow PVA glue can be applied to the edges of each piece but this is not essential.
4.	Continue until all pieces are assembled.
5.	Adjust pieces until all gaps are closed up.
6.	Reinforce with long pieces of sticky across the panel.

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Marquetry, Continued

Stage 4 - Gluing down

The final stage is to glue the panel into position. The type of backing will depend on the use of the panel. The panel can be glued onto a timber panel as marquetry panel or onto a thin veneer for inlaying into another piece.

Either way the technique is similar.

Step	Action
1.	Turn marquetry panel upside down. Bush glue onto the reverse side. Ensure all pieces are glued. Best glue is Urea formaldehyde however, Yellow glue or 'hot stuff' can do the job. **Note:** There is no need to remove the backing paper.
2.	Turn panel over and apply to backing board. Working quickly before the glue sets, manipulate each piece to close up any gaps.
3.	When dry, remove paper pattern and reveal the veneer pattern. A damp sponge can soften the paper. Citrus oil will dissolve the spray contract without dissolving the photocopier toner.
4.	After panel is thoroughly dried, use a scraper to level the varying thicknesses of veneers to the same level and lightly sand.

Balancing the panels

It is important to balance the panel by applying a veneer of similar thickness to the underside of the panel. This is particularly important when fixing the panel on to a veneer backing. There should be at least three (3) leaves of veneer (including the panel itself) with each leaf laid perpendicular to each other. If more layers are used ensure there is an odd number of layers.

References

Further Reading

Marquetry Techniques, David Middleton and Allan Townsend

Magic Wood of Marquetry, Victoria Marquetry Society, (Available from School of Arts Library)

Understanding Wood, Hoadley, Tauton Press