Chapter 2 - Getting Started

There are various ways in which a mandolin can be constructed. At its most basic, using a flat soundboard and back it is a relatively simple exercise that can be put together in a few weekends' work without too much in the way of specialised tools. At the other end are mandolins with carved soundboards and backs, with the ultimate in this the F5 style mandolin with its asymmetric extravaganza of late-Victorian ornamentation. As there are plans, books and videos/DVDs available dealing specifically with constructing an F5 this book isn't going to cover them, but rather a simpler carved oval-hole instrument, a carved-top/flat-backed Celtic style mandolin and one with a bent or canted top as well as a relatively simple instrument with a flat soundboard.

The plans at the back of the book have two different mandolin shapes: one inspired by the Gibson and Lyon & Healy designs of earlier last century and another more rounded model in the modern Celtic style.

Either of these shapes can be used with either a flat, canted or carved soundboard and a flat or carved back, though there will be four specific combinations illustrated in the following chapters and in the plans at the back of the book. These will be:
1. a flat-top/flat-back
2. a canted-top/flat-back
3. a carved-top /flat-back (Celtic style)
4. a carved-top/ carved-back.

A lot of the information will be general to all the instruments, but some will only apply to a particular mandolin. Some chapters will be generalised, but Chapter 11 deals with the specifics of assembling the four instruments. There will inevitably be some overlap and duplication and an amount of going back and forward from generalities to specific information.

For the flat-back instruments a bolt-on neck will be used, while the neck will be glued in place on the fully carved model. This design uses more a pear-shaped body with a curved section around the neck heel in the manner of the Gibson and Lyon & Healy designs of the 1920s.

Most of the time a couple of different approaches to specific procedures will be described. One will involve using mainly hand tools, while the other will be more based on using power tools. Using only hand tools may give some extra, romantic satisfaction to the process, but much of the time a powered machine can do the job more quickly and more accurately. Carving the back of a mandolin out of piece of figured hardwood with just a gouge and a little plane may appeal to the purist, but it is much easier on the wrist and shoulder to chop most of it away with a wood carving blade on an angle grinder.

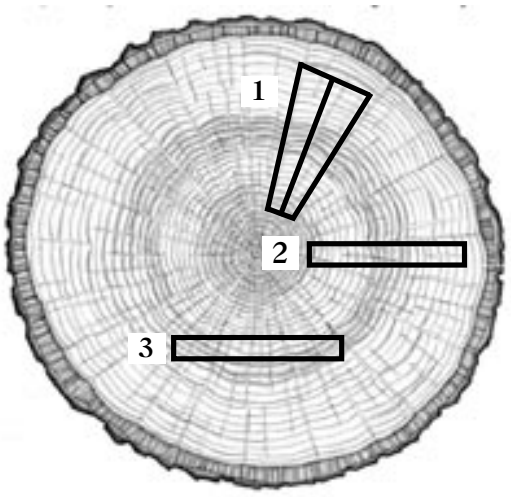
Measurements

Measurements are, most of the time, given in both metric and imperial. Sometimes just one or the other when it something is supplied or only available in one type, or when it is simpler or more obvious in one style of measurement only.

Timbers

Mandolins can be made from the same timbers as any other stringed instrument, such as guitars or violins. Various kinds of spruce - Sitka, Englemann, Adirondack, or European - for the soundboard are combined with a wide variety of temperate and tropical hardwoods for the body and neck, with fretboards and bridges most often made from ebony or one of the American or Asian rosewoods. Carved back instruments are usually constructed from maple (acer sp.) of one sort or another, Bigleaf, Rock or Red maple from the US/Canada or European varieties.

Specialist tonewood suppliers such as Luthiers Mercantile have a bewildering array of timbers that can be used for backs and sides, and the relatively small sizes of the pieces needed for a mandolin can mean that even the most exotic can be purchased fairly inexpensively. This can also mean that interesting small pieces can often be found in a timberyard aimed at the furniture trade, though there can be the problem of getting wood resawn into useable thicknesses if a decent sized bandsaw is not available.



1. A split wedge
2. A quartersawn plank
3. a slabsawn plank

The most important factor to consider when buying the timber needed for a mandolin is how it was sawn or split out of the log in the first place. Most of the time the instrument maker wants quartersawn timber, with the annular growth rings as close as possible to being perpendicular to the widest face of the board and the lengthways cuts following the grain of the wood. Quartersawing a log is the least efficient way of cutting it up, both in terms of the effort to do it and the amount of lumber produced at the end, but quartersawn timber is the most dimensionally stable as the timber is dried. Many, but not all, species exhibit the most interesting figure in the wood on the quartersawn face.

The specialist tonewood suppliers will try to oversee the entire processing of the log, so what they sell is optimally cut for it's end use. Softwoods for the soundboard are often cut to appropriate lengths in the forest as the tree is felled and then the log sections are split into manageable billets and dried before being sliced into soundboards. The splitting means that it is easier to then do the final cutting with minimal 'runout'. On a perfect soundboard a sliver pulled off one corner would run the entire length of the soundboard. Most of the time little twists and irregularities in the tree means this won't happen, but a sliver should run several inches along an edge before tapering away to nothing. Less runout means that it will be easier to plane the soundboard, as

bookmatched flat soundboard halves will have the runout going in opposite directions and planing across the centre join can get tricky.

Hardwoods would be more typically cut into 50mm-75mm (2-3") planks and dried before being resawn into thinner slices for backs and sides or blocks for neck stock. If the wood is being air dried, the general rule of thumb is a year per 25mm (1") of thickness, though kiln drying can accelerate this process. Like wood for soundboards it is important that the plank be cut following as closely as possible the grain of the timber. Wood can be imagined as a bundle of straws held together by the bark, and it is preferable for the sawing to take place as much as possible following the line of those straws. This isn't always practical or even possible as trees bend and twist as they grow and sawmillers will often have to compromise between end yield and the practicalities of sawing.

There are those who will only use air dried timber, and then have it stored for several years before use. For the amateur builder this may not be practical, and the larger instrument manufacturers use kiln dried timber regularly. The difference between air and kiln dried wood is one of ongoing discussion in the stringed instrument world, but most people will admit that properly kiln dried timber is perfectly acceptable. The important thing is that it is dry.

Wood purchased from a specialist tonewood supplier will usually be dry to a stable point where the free moisture in the wood has gone, but the wood will still absorb and loose moisture depending on the local humidity levels. It is advisable to have any timber to be used in the workshop environment for a few weeks at least so it matches the conditions in the workshop.

Humidity control

Humidity, or at least the extremes of it, is the great enemy of stringed instruments. Wood absorbs and loses moisture continuously as the relative humidity fluctuates, and changes size as it does so. An unbraced flat guitar soundboard can change width by up to 2mm at the extremes of humidity, such as going from a rainy day (or the US Midwest in summer) to a desert environment. While this doesn't matter when there are no braces attached, once other bits of wood are glued across the grain, the plate cannot contract and expand in the same way. The plate will still absorb and lose moisture, as will the braces, but the constriction of the bracing will mean that the plate will dome up as humidity increases, and flatten out as it decreases. The bracing on a flat top or back instrument should be shaped into a curve before being glued to the plate and for these instruments a 15' (15 feet) radius curve is suggested. This curve is both practical and aesthetic. It means that even if the humidity falls to very low levels the plate won't go entirely concave and in very high humidity the dome is only accentuated a little more.

A relative humidity of 40% is strongly suggested for all gluing of braces on flat soundboards and backs and for gluing the fingerboard to the neck. Cheap electronic humidity/temperature meters can be purchased at electronic suppliers which are accurate enough for this application and can be combined with a dial hygrometer and checking on-line weather reports. It is

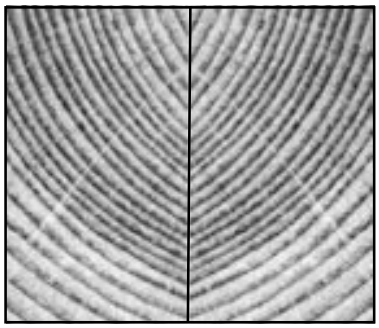
guaranteed that gluing soundboard or back braces in times of high humidity will be regretted.

What is most damaging to stringed instruments is sudden large changes in humidity and temperature. Gradual changes from one extreme to another can be coped with but rapid changes can be catastrophic with soundboards literally cracking apart.

Materials and tools

Once the particular mandolin to be built has been decided, the next step is to get the timber and hardware for the mandolin, as well as materials for the forms and jigs. Some specialist tools will be required, especially for the fretboard and if a carved soundboard or back is planned, but otherwise most will be found in a reasonably well set up woodworking shop.

Luthier suppliers such as Stewart McDonald and Luthiers Mercantile can supply all the materials required or there are numerous instrument timber suppliers, some specialising in mandolin tonewoods, who can supply the timbers and the various bits of hardware such as the fretwire, tuners and tailpiece can be sourced separately.



Endgrain view of two non-quartered boards laminated for a neck

In general a mandolin will require:

• Soundboard - two bookmatched pieces of quarter sawn Sitka, Englemann, Adirondack (Red) or European Spruce, Western Red Cedar, or Redwood - for a flat-top 380mm long x 140mm wide x 5mm thick (15" x 5.5" x 3/16") or for a carved top 380mm x 140mm x 20mm (15" x 5.5" x ⅞")

• Back - two bookmatched pieces of hardwood, such as Bigleaf, Rock or European Maple, Walnut, Mahogany, Rosewood, Tasmanian Blackwood or other appropriate hardwood (there's lots of choice) - for a flat-back 380mm long x 140mm wide x 5mm thick (15" x 5.5" x 3/16") quartersawn or for a carved back 380mm x 140mm x 20mm (15" x 5.5" x ⅞") where the quartersawing is not so important in timbers such as maple as the figure can often be more spectacular when slab sawn.

• Sides - two bookmatched pieces of the same wood as the body, preferably cut from the same billet to match in colour and grain - 500mm x 50mm x 5mm (19" x 2" x 3/16"), although for the bent-top instrument the initial width should be 65mm (2.5").

• Neck - one quartersawn piece 380mm x 50mm x 50mm (15" x 2" x 2") This can be of the same timber as the back and sides or a complementing species, such as mahogany with a rosewood body. The grain can run parallel or perpendicular to the fretboard. Alternatively, non-quartersawn timber can be used, but laminated so the endgrain is in a mirror image.

• Neck re-enforcement – These mandolins use a ⅜" x ¼" epoxy-carbonfiber bar as

re-enforcement, though a ½" x ¼" would also be suitable. Alternatively an adjustable truss-rod could be installed, either a Gibson style single rod, or a double rod type.
• Fretboard - ebony or rosewood, bought either as a roughsawn blank or purchased thicknessed to 5mm (3/16") with the fret slots cut (recommended!)
• Headstock veneer - ebony, rosewood or other decorative timber - 200mm x 100mm x 2mm (8" x 4" x 3/32")
• Linings - kerfed or solid linings are used on the inside of the sides to provide more gluing area when attaching the soundboard and back. These can be brought ready made from most luthier suppliers or they can be simply made from strips of light but strong timber such as mahogany.
• Bindings and purfling - timber or plastic - these can be brought from luthier suppliers in a variety of materials, or timber bindings can be made in the workshop from offcuts. Celluloid, especially ivoroid or tortoiseshell, bindings have been traditionally used for many mandolins, but concerns about flammability mean that some suppliers have ceased to carry it and postage may be difficult. It doesn't seem to be as big a problem once it is attached to an instrument, but a strip of it is apparently much more dangerous. Other forms of plastic binding are available, but they don't have the appeal of the ivoroid or tortoiseshell celluloids. Purflings are also available in plastic or timber veneer, and are often used in various combinations of black and white.
• Fretwire - 600-900mm (2-3') narrow fretwire which is around 1.2mm (.050") wide, though there is no real reason, other than that the fret slots get rather close together at the top end of the fretboard, not to use the more common 2mm (.080") wire.
• Tuners - mandolin tuners come in either F or A style. The F style have the buttons staggered to fit on a Gibson F style headstock, while the shafts on the A style are the same length. Many F style tuners have the shafts for the buttons below the gears (where modern tuners have the shafts above) so they would fit better on the asymmetrical F model headstock. Having the shafts above should mean that string tension more positively engages the worm and cog gears, but many of the 80 year old F model tuners are still working fine. Grover, Gotoh and Schaller are the commonly available brands, though if a slotted head design is used only the German Schaller and Rubner companies make tuners for these, and they can be hard to come by in the US.
• Tailpieces - the pressed metal Gibson design is very commonly used, though there are heavier cast tailpieces available from specialist supplier such as Randy Allen, Bill James and others. The heavier cast tailpiece should add sustain and perhaps some more volume.
• Bridge - the style of bridge used depends on what type of mandolin is being built. For a flat soundboard a solid bridge is most practical, as the bridge will only by 12-15mm (½-⅝") high, but for the carved soundboard there is the option of an adjustable bridge.

Glues

Several different types of glue are used at various times in these instruments. For most of the gluing a PVA glue is used, either Franklin Titebond (the original formula, not the II or III version) or Luthiers Mercantile white Instrument Makers Glue.

Both of these set up much harder than the ordinary white PVA woodworkers glue commonly available in numerous brands. Titebond is a an Aliphatic Resin Emulsion and of a yellowish colour, rather than the white colour of most PVAs. While there are other yellow glues on the market which might work just as well, Titebond has been the standard glue in the guitar building industry for many years. The alternative is Luthiers Mercantile's Instrument Makers Glue, which works very much in the same way, with the possible advantage that it dries clear, rather than a light yellow colour. One thing to be careful about using both glues is that they don't work if the temperature is below 10C or 50F. They dry to a white chalky consistency which probably is not very adhesive.

At the same time there are instrument makers who will only use hot hide glue. This glue has been used for centuries and is the standard glue used by violin makers. It is a gelatine made from animal skins and requires dissolving in water and heating before use. While its adhesive qualities are excellent it is more fiddly to use than PVA.

Epoxy is used for gluing the fretboard to the neck. The advantage of epoxy for this joint is that it does not add any moisture to the join, which can lead to a backbow to the fretboard. Both Stewart MacDonald and Luthiers Mercantile sell epoxies suitable for woodworking, and there are others available such as West Systems, Z-Poxy and NHP. A 30 minute use time is suggested. Some users suggest adding a thickener when gluing fretboards. Cheaper, hardware store or supermarket 5-minute cure epoxies are useful for gluing inlays into the head of an instrument, and can be coloured with wood dust to match the colour.

Cyanoacrylate glue, often called super glue or CA, is useful for gluing in fretboard markers or side position dots as well as repairs in ebony and rosewood when mixed with a little sanding dust. This glue comes in a variety of viscosities for different uses, but the cheap varieties available in supermarkets are fine for the uses mentioned above.

Jigs and forms

There are only a few jigs and forms really necessary to build a mandolin, but instrument builders will always find a reason to make another jig.

Q. How many luthiers does it take to change a light bulb?
A. Only one, but it will take six months to make the jig.

The Mould

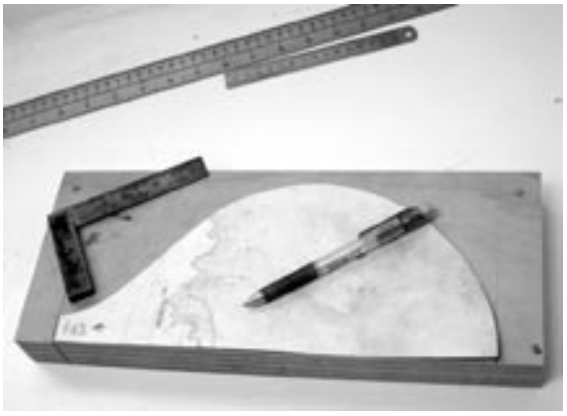
The main form needed is a mould to build the sides and block assembly. This can be made from 18mm (¾") plywood or MDF with raised sections at each end to act as clamping supports for the neck and tail blocks. Strips of wood are screwed onto each side to raise the main form so it sits in the middle of the sides. This makes it possible to glue the linings in place while the side and block assembly is still in the mould.

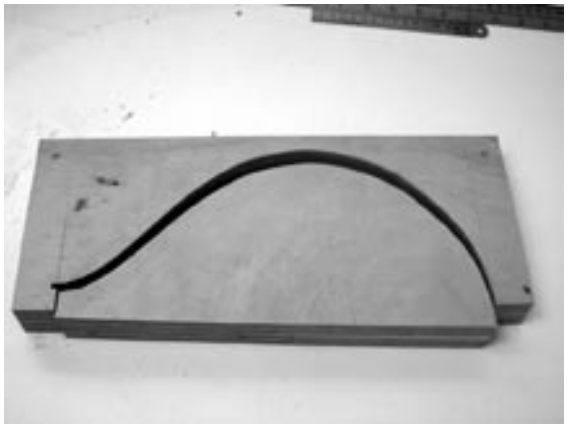
Start with two pieces of 18mm (¾") plywood or MDF 150mm x 380mm (6" x 15"). Clamp them together and drill holes in two corners so they can be held together with lengths of dowel or screws when cutting out the

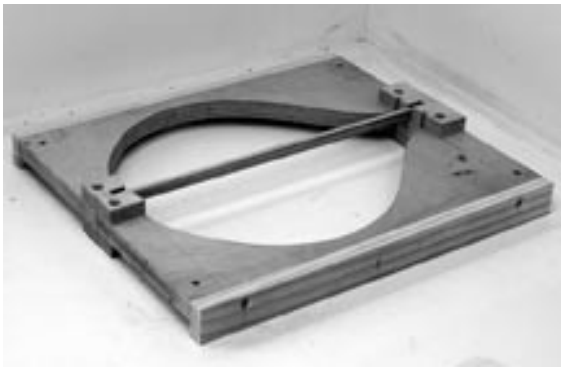
mandolin shape to ensure symmetry. Trace the outline of the body and cut it out on a bandsaw and sand smooth and square to the marked line.

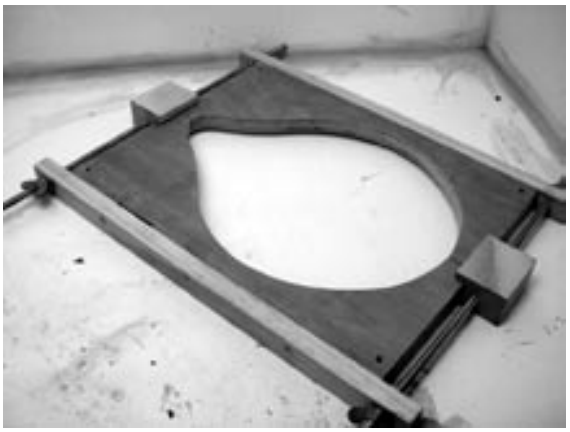
Blocks or strips of wood need to be added to the bottom so that the form sits in the middle of the sides. For example, for a 45mm side width, the form should be raised 13.5mm, but a bit either way will make little difference. For the mould illustrated on the right a piece of scrap ply was planed down to the correct thickness and used for the clamping extensions at each end which are screwed into place which also holds the two halves of the form together. The two blocks on the upper surface have a ¼" x ⅜" slot cut precisely on the centre line to assist in lining up the neck block which has a matching slot. These slots are the same size as the carbon fiber neck re-enforcement and will also assist in aligning the neck when that is attached.

Instead of screwing on the clamping blocks at each end to hold the two halves of the mould together, two lengths of threaded rod can be used. The clamping blocks should be notched to align the two halves of the mould and a hole drilled to accept the threaded rod.









This mould is illustrated on the bottom left of the previous page

There are lots of variations on the outside mould and almost everyone has a slightly different take on the idea. Some builders use an inside mould in the manner of violin makers.

Soundboard and back joining jig

There are lots of different ways to join flat-tops and backs. This jig uses the traditional Spanish rope and wedges method which is quick and simple, but like all such methods is dependent on getting the edges to be glued absolutely straight and vertical.

For the thicker material used for carved tops and backs it is a bit trickier. Again the edges to be joined have to be absolutely straight and at right angles to the inside surface. A very well set up plane will do the job, and it should be possible to glue the halves with a simple rubbed joint, using no clamps and relying on the suction of the glue on the perfectly matched surfaces.

For those less confident in their tools or their skill with them, the edges can be sanded flat, and then brushed and wiped down with alcohol to get rid of the sanding dust, before gluing and clamping with two or three pipe or bar clamps.

For both flat and carved plates, a shooting board to hold the wood to be jointed in the middle of the plane blade is required. There are, again, many other ways to do this. Some people clamp the plane horizontally or upside down and move the timber over the plane sole.

Radiused dished workboards.

These are irrelevant if building a fully carved mandolin as the top and bottom edges are parallel and the gluing surfaces are flat, but for instruments with flat soundboards and/or backs these are very useful. These are available commercially in a number of different radii, usually designed for guitar building use, but it is a simple and cheap device to build. A 15' radius is suggested for both the front and back of a mandolin, but a tighter, 12', radius could also be used. Materials needed are two pieces of MDF or plywood 500mm (18") square, one 18mm (¾") thick and the other 3mm (/8") thick as well as twelve pieces of dressed 2x1" pine that are around 215mm (8.5") long.

Drill a ¼" hole in the middle of both pieces of the MDF/ply and cut a 450mm (17") diameter circle. A piece of wood with a ¼" hole at one end and another 225mm (8.5") away to take a pencil makes a simple compass. Using the 15' radius pattern in the plans at the back of the book, cut curved strips from the lengths of 2x1 pine. The pieces should end up 5mm (3/16") thick at one end and 10mm (⅜") thick at the other. Glue the first two so they butt together in the middle, and add the others shortening them as required, as pictured on the previous page.

Once all are in place sand any unevenness out and glue on the piece of 3mm MDF/ply, using a short length of 6mm or ¼" dowel to line them up. The best way to apply pressure is with go-bars in a go-bar cabinet. This is simply a rigid structure with a floor and ceiling and lengths of dowel the same length as the distance between floor and ceiling. Suppliers offer wood or fibreglass bars 24" in length, though longer ones are not a problem. Mine are 42' in length and made from 10mm (⅜") dowel.

Auxiliary Workboard

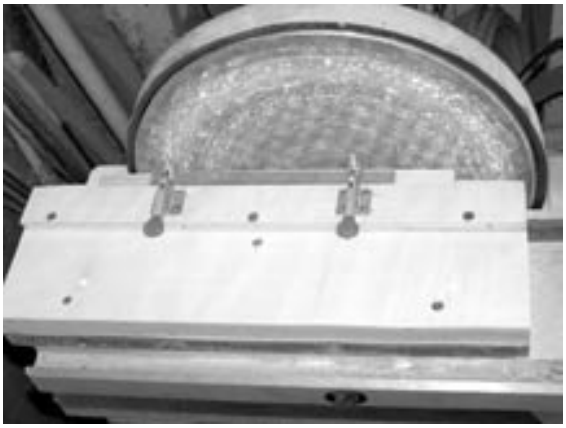
A useful addition is also an auxiliary workboard that can be mounted in a vice, especially one that rotates, and used for jobs such as brace carving where it is good to be able to get at the work from several angles. Holes can be drilled in the workboard for specific tools like circle cutters and radiused sanding disks.

Spoolclamps

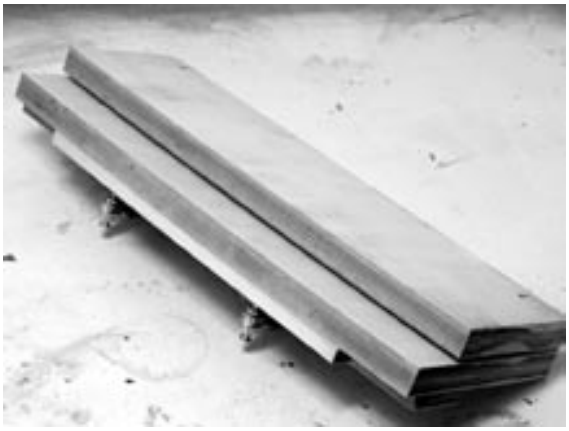
These are the most effective way to glue soundboards and backs to the ribs and are made simply from a 2 ½" x ¼" hex head bolt, a couple of washers, a wing-nut and two 35mm (1½") disks cut from a polyethylene chopping board with a hole saw. 24 are needed.

Radius Sanding Jig

This is a jig which sands a curve on one edge of a brace using a disk sander. Two toggle clamps hold the piece to be radiused on the jig, while a bearing surface of the curve to be duplicated rides along a length of metal angle bolted to the sander's table. The pictures illustrate how it is put together. Exact measurements are not important, but getting the curve to be copied correct is vital.



Sanding a brace with the jig. The toggle clamps bear on a strip of scrap timber. The length of metal angle can be seen on the right.



The bottom of the jig showing the 15 ft radius bearing surface on the base.

Tools

Stationary power tools

Essential:
Bandsaw - preferably at least 14" wheel size. A ¼" wide, 6 tooth per inch is a good general purpose blade
Drill Press – a mid-size bench mounted model with a ½" chuck, two or three sanding drums from 1.5" up to 3" in diameter as well as a selection of standard twist, brad point and Forstner bits.
Disk Sander – a 8-12" disk sander
Router table and a 1HP+ router
Preferable:
Wide belt drum sander – such as the Performax 16/32 or one of the clones
Thickness planer – such as a 12" Delta or similar
Jointer – a 6-8" model with a reasonably long bed

Small power tools

Essential
Electric drill, mains powered
Preferable
Drill/driver, battery powered
Laminate trimmer for binding jig
Orbital sander, for flat backs/soundboard
Dremel, or similar with various accessories

Hand tools and other useful things

Hygrometer, humidifier or dehumidifier (target is 40% relative humidity)
Clamps - you can never have too many
- 6-8 small cam clamps
- 4 large cam clamps
- an assortment of G and F clamps
- several dozen spring clamps for kerfing (wooden clothes pegs or plastic)

Bench vice - preferably a Versa-Vice or Parrot vice which can rotate
Chisels - a range from ⅛" - 1"
Planes - a long shooting plane for joining plates, a smaoothing plane, a block plane (a Veritas apron plane is a good one), small curved bottom planes for carving soundboards and backs, with extra toothed blades
Cabinet scrapers: straight and curved
Sharpening stones and honing guide (the Brian Burns system from LMI or the Veritas)
Purfling cutter for binding ledges
Sanding blocks
Machinist's square
Sliding bevel
Screwdrivers
Bradawl
Plastic compass for determining angles
Saws - razor saw, fretting saw, jewellers saw (for inlay)
Exacto knife
Files: smooth mill file for fret filing and nut files
Small flat rasp for edges
Fretting hammer
Wood rasp, Surform or Microplane rasp, spokeshave for neck carving
Violin type peg reamer
Rulers - 6", 12" and a longer one, preferably in both imperial and metric
Dial caliper for measuring thickness of sounds, back and sides
Fret cutters (flat-head nippers)
Fret crowning file

A rasp used to form the edge hieght on carved plates

Consumables

Glues:
- wood glue (Titebond or LMI white glue) and/or hot hide glue
- cyanoacrylate (superglue)
- binding glue for plastic binding
- epoxy: a good quality 30 minute epoxy for fretboard gluing, a finishing resin for sealing/grain filling and a hardware store 5 minute for inlays
Masking tape for binding
Sandpapers (80, 120, 180, 240, 360grit aluminium oxide and 400, 600, 1200 grit wet & dry for frets and finishing)
Finishing and buffing materials (see Chapter 12 for options)
Offcuts of plywood, acrylic sheet, cork tile, leather, wood for clamping cauls

The order of Construction

This is a description and brief listing of the order the various processes happen for the different instruments.

Mandolin No 1 - flat-top/back

This is the most basic of the mandolins. Both the soundboard and back are arched to a 15' radius spherical dome with curved braces. The soundhole is round with simple purfling rosette. The top is bound, but the not the back. The neck is bolted on with a single bolt which attaches to a threaded insert in the neck heel. The neck is re-enforced with a carbonfiber bar which extends into the body to both helop align the neck and support the fretboard over the end of the body

1. Build the side and block assembly with the sides 45mm (1 ¾") wide - Chapter 3

2. Build the soundboard and back - Chapters 4 & 6

3. Fit the soundboard - Chapter 10

4. Build and fit the neck - Chapter 9

5. Glue the back - Chapter 10

6. Make and fit the bindings/purflings - Chapter 11

7. Final sanding and application of finish - Chapter 12

8. Fit hardware, nut and bridge, string and set-up = Chapter 13

Soundboard - Sitka Spruce
Back & sides - Tasmanian blackwood
Neck - Tasmanian blackwood
Fretboard & bridge- ebony
Binding - Ivoroid plastic
Grover tuners

Mandolin No 2
- the canted-top / flat-back

1. Build the side assembly with the sides 60mm (2 ⅜") wide - Chapter 3

2. Make the soundboard and back - Chapters 5 & 6

3. Shaping the sides and linings - Chapter 10

4. Fitting the soundboard and back - Chapter 10

5. Fit the neck - Chapter 9

6. Glue the back - Chapter 10

7. Fit and glue the bindings/purflings - Chapter 11

8. Final sanding and application of finish - Chapter 12

9. Fit hardware, nut and bridge, string and set-up - Chapter 13

Soundboard - Sitka Spruce
Back & sides - Black walnut
Neck - Rock maple
Fretboard & bridge- ebony
Binding - Splated rock maple
Rubner tuners

Mandolin No 3 - the Celtic

This style of mandolin is a hybrid between the flat soundboard mandolin and the carved American style. The soundboard is carved, while the back is arched only by braces in the same way as the previous two instruments. This general type of construction has been popularised by English builder Stefan Sobell and often used by musicians playing Irish and Scottish music. The neck is again bolted on. The instrument pictured has a wider than normal neck and has been set up lefthanded.

1. Build the rib assembly with sides 40mm (1 ½") wide - Chapter 3

2. Make the carved soundboard and flat back - Chapters 6 &7

3. Fit soundboard and back and glue the soundboard to the sides - Chapter 10

4. Make and fit the neck - Chapter 9

5. Glue the back - Chapter 10

6. Fit and glue the bindings/purflings - Chapter 11

7. Final sanding and application of the finish - Chapter 12

8. Fit hardware, nut and bridge, string and set-up - Chapter 13

Soundboard - Sitka Spruce
Back & sides - Tasmanian blackwood
Neck - Tasmanian blackwood
Fretboard & bridge- ebony
Binding - Ivoroid plastic
Allen taipiece
Rubner tuners

Mandolin no. 4
- carved soundboard and back

1. Build the side assembly with sides 36mm (1 7/16") wide - Chapter 3

2. Carve the soundboard and back - Chapter 7

3. Glue the soundboard - Chapter 10

4. Build the neck up to fitting it to the body - Chapter 9

5. Finish the neck and glue in - Chapter 9

6. Glue the back - Chapter 10

7. Fit and glue the bindings/purflings - Chapter 11

8. Final sanding and application of the finish - Chapter12

9. Fit hardware, nut and bridge, string and set-up - Chapter 13

Soundboard -Sitka Spruce
Back & sides - Bigleaf maple
Neck - Bigleaf maple
Fretboard & bridge- ebony
Binding - Tortoise celluloid
Allen taipiece
Grover tuners

There is nothing on this page. Feel free to doodle.