



The boxmaker's art

Ian Hawthorne's Art Deco-inspired jewellery box shows that small can not only be beautiful but keenly accurate, too!



Ian Hawthorne has been a boxmaker for over 10 years during which time he has created pieces for customers in all corners of the globe, from the UK to Australia, and Finland to the USA. Examples of his craft are currently on display at the Designyard Gallery, Dublin, and you can see more of his work at www.hawthornecrafts.com.

I'm delighted that my first article for *Good Woodworking* magazine is about one of my latest creations – *Steps*, an Art Deco-inspired jewellery box. I've long found myself drawn towards Art Deco's combination of the streamlined and the geometric, and its use of rare and unusual materials. New York's Chrysler building, for instance, is a truly inspirational example of Art Deco at work, juxtaposing as it does references to ancient Egypt with the modernity of stainless steel and the precision of the machine age.

Clean, strong & accurate

In my own work, my aim is to create striking boxes with strong, clean, and well-proportioned features with the accent very much on accuracy throughout. To this end, I've found that the ideal way to focus the ideas that swirl around in my mind is through the discipline of technology: I use two free software packages,

Sketchup and Kerkythea, to translate inspiration into computer-generated prototypes of all my boxes. While the design of the *Steps* box may initially have existed in a virtual 3D modelling programme, however, I always had the very real qualities of the materials from which it would be made in mind.

For the box's carcass, I used a lovely piece of well-seasoned quarter-sawn ripple sycamore that had been in the workshop for several years. The design on the top of the lid, meanwhile, is fashioned from ripple sycamore veneer, and its border from black acetal with inlays made from white-tinted liquid polyester. This contrast, which is so characteristic of Art Deco, continues inside the box with the rosewood trays and the bold, mustard-yellow suede lining. The finishing touch comes from the hardware, for which I chose quality nickel-plated pieces matched by an escutcheon of my own making.

► Pic.1 A single drawer lock cutter will produce both halves of the lock rabbet joint, which is clean, tight, and strong



Veneering the lid

The first step was to prepare the sycamore in my usual way by truing-up one side, planing the timber to within about 5mm of its final thickness, and then taking it indoors to settle for a week or so while I turned to veneering the box's lid and base, and the tray bases.

The substrate of the lid is 6mm (1/4in) birch ply, and the box's base was made from 3mm (1/8in) MDF. To prevent distortion, I applied a balancing veneer – which, because it's hidden by the lining, didn't need to be anything exotic – to both the lid and the base. However, while the base is veneered with plain sycamore, the lid is decorated with a geometric design made up of two panels, each containing 11 pieces of ripple sycamore veneer cut as shown on the plans (p50) to create the geometric pattern from their contrasting grain.

To make these pieces, you really need nothing more complicated than a fresh scalpel or veneer saw, and some MDF templates to trim them to their finished sizes. Start by cutting each piece fractionally over-size, remembering, if you're not using a veneer saw, to ensure that the bevel on the blade addresses the sycamore in such a way as to leave a square or undercut edge so as to minimise gluelines. I cut my sections, however, using a Warco WM16 mill fitted with an auxiliary table; and, as one side of the design is a mirror image

TIP

I used epoxy when veneering the lid and base. It's more expensive than PVA, but I find that it locks the veneer and substrate together more securely, and this – together with the fact that, unlike PVA, it has almost no tendency to creep – helps to ensure that the panels stay flat, which is an important consideration in boxmaking.





of the other, I also saved myself a little time by making the paired pieces simultaneously.

The two halves of the pattern are then built-up separately, starting by cutting a straight edge on the line A-B (see plans) and joining the two pieces with tape and PVA. Set the workpiece aside for about 15 minutes before cutting the next straight edge C-D and taping the adjoining pieces together.

Continue building up the halves in this way until you're ready to join them together along a final scalpel cut and, voila! – you have the patterned veneer for your box's lid. The next step is to apply it, along with the balancing veneer, to the ply substrate. To do this, you can either clamp the workpieces between two pieces of 25mm (1in) thick MDF or, if you have one, use a veneering press or vacuum bag.

◀ Opening the lid reveals a mustard-yellow suede interior, continuing the Art Deco character of the box

Cutting the joints...

Leaving the veneers dry, the face of the acclimatised sycamore can now be trued up and the timber planed to a final thickness of 12.5mm (½in), taking the same amount of waste from both sides to help balance any residual stresses. Next, true an edge, rip the sycamore to width and, after marking along the bottom of the board with a pencil to create your reference edge, lay out the board for the carcass.

Because I like the joinery on my boxes to be as discreet as possible, I use what's sometimes called a lock rabbet joint to assemble the box's carcass. It's a joint that can be cut on a table saw, but I prefer to use a drawer lock cutter in the router table. By cutting the sides when they're held vertically against the fence, and the front and back when they're flat on the table, this single cutter is able to produce both halves of the joint, which is clean, tight, and strong, **Pic.1**. Needless to say, the height of the bit is crucial, and some test cuts should be carried out to produce a joint in which the exposed end-grain on the outside of the box extends by about 1mm; this will be trimmed after glue up.

TIP

Talc keeps your grits clear

To help prevent very fine grit papers from clogging, try rubbing talc into the face of the paper.

...and housings for the base & lid

Before routing the grooves that will house the lid and base, sand the show side of the base, working through the grades to 320-grit. With a 3mm cutter fitted in the router table, set the distance from the edge of the bit to fence at 4mm (½in), and the depth of cut to 0.5mm, and take a skimming pass, remembering to keep the reference side against the fence.

Raising the bit by 1.5mm each time, continue making passes until the groove is 5mm (¾in) deep; you can then widen the groove until it matches the base's thickness perfectly. While this neatness of fit is easily achieved with an Incra fence, with a basic fence you'll do well to check your settings.

Unlike the base, the box's lid is glued in after the carcass has been glued up, and is set into a 9mm (¾in) deep rebate so that – allowing for the thicknesses of substrate and veneers – it sits about 0.25mm below the top edge of the box. When setting up the router for this cut, make sure that you're using the same reference edge that you used to cut the base groove.

The last routing task for the moment is to cut a slight chamfer on the arris of the base groove that will be visible on the finished box. This will not only dress out any tear-out that may've occurred, but will also create a shadow gap that will disguise any irregularity caused by a slightly loose-fitting base. You can form this chamfer with abrasive paper and a block, but I use a V-groove bit in the router to take a very fine cut using the same reference edge as the other operations.

Prepping & gluing the carcass

So far so good; now it's time to measure up the sides and cut your base exactly to size. Apply a coat of sanding sealer to the area on the carcass pieces below the base groove. Once dry, sand the base with 1000-grit, followed by Webrax 1200, then apply a coat of wax and buff it to a polish.

Before going on to glue-up the four sides and base, ask yourself if this gluing-up scenario sounds familiar: you're trying to measure diagonals before the glue can start to grab while the box is out of square when, all at once, the phone starts to ring, your wife tells you that dinner's ready, and the dog begins barking at the neighbour's cat. If that sounds like you,



▲ Pic.2 Simple, but well worth having: a right-angled jig is a stress-free way to get your boxes square first time

then a stress-free way to get your boxes square first time is to make yourself a right-angled jig (**Pic.2**); it's very simple, but well worth having.

I use PVA to glue the joints on my boxes, but if you think you may need a bit more working time, try using Titebond's liquid hide instead. Either way, let the carcass sit overnight before going on to glue the lid into place, for which you'll need to make a small pressure jig. This is nothing more than a panel that's slightly smaller than the lid itself, and which is edged with 3mm MDF so that the cramping force is applied around the outside where the lid sits against the shoulder of its rebate, and not to the unsupported centre of the lid.

Once the glue has dried, you can clean up the extended rabbets of the corner joints. You can use a sharp chisel for this, but my preference is to use a bearing-guided flush-trimming router bit, which makes short work of tidying up the joints.

Next, sand the bottom of the box on a sanding board to create a reference edge with which to guide the router so that you can trim the top edge flush with the lid. I use a spiral bit for this job, though you can use a straight bit, too. The trick is to set the height of the bit so that it extends just above the top edge of the box, and position the fence so that you're taking the lightest of cuts. Then, feeding the box from the opposite side of your router table to avoid climb cutting, trim back the edge until it's flush with the veneered lid, and finish off by sanding the front, back and sides through the grades to 240-grit.

Removing the lid

The lid is separated on the bandsaw keeping the reference side – the base, that is – to the fence. To determine just where the cut should be, I divide the total box height by 3.5 to arrive

at the lid-to-base proportions. If you don't have a bandsaw, you can use the router table or even handsaw to separate the two parts, though you must make sure that your blade is square to the table.

Once separated, let the box sit for several days before fitting the hinges (see How to perfect hinges on p34) and the lock. I use full mortise locks for my boxes – which is to say one whose body is set tenon-style into a mortise – as they're very neat and also easy to fit. Once again, the mortise can be cut on the router table, or drilled out and cleaned up with a chisel.

The keyhole in the box can then be marked and drilled, while the escutcheon (which will be fitted later) is made up from layers of ebony and aluminium which are glued together and cut to size when dry. You can then drill the escutcheon's keyhole, and file or sand it until you get a nice fit; the finishing touch is a small chamfer around the escutcheon made with a sanding block.

Fitting the banding...

The banding is made from acetal, which is readily available in sheets of varying thicknesses from plastics suppliers, and works well with the polyester inlays. By this I mean that, while you could create the contrasting banding with ebony, there's always the risk that the polyester – which is applied in a liquid form – will creep into the pores of the wood and spoil the crispness of the detail.

I cut the acetal from 3mm-thick sheet to produce 12mm (½in) wide strips long enough to fit around the box. The rebate in which the strips sit, meanwhile, is another job for the router, and one that will need carefully setting up in order to leave the banding standing just proud of the lid.



◀ Pic.3 To mitre the strips of acetal banding, Ian uses a disc sander fitted to his lathe and two mitred fences

To mitre the acetal strips, I use a disc sander fitted to my lathe with two fences, **Pic.3**. To align the banding accurately with the corners of the box, fit reference pieces to either end of the box to form stops, and glue the front strip into place using polyurethane glue (scoring the back of the acetal with 100-grit paper will provide a good key for the adhesive) and hold it in place with masking tape while it dries, **Pic.4**. Take care how you apply glue to the ends of the strips – you don't want to glue the reference strips in place! Continue fitting the banding around the rest of the box and, when dry, scrape it flush with the lid using a sharp scraper, and round over the edge.

...and adding the detail

The recesses for the polyester inlay should be routed to a depth of 1mm using a 1.5mm bit, though in the interests of accuracy I used my mill for this job. The liquid polyester and colouring agent (which can be sourced from suppliers such as Tiranti – see the casting section at www.tiranti.co.uk) are then poured into the recesses using a needle syringe to reduce any bubbling which would spoil the finish. Once dry, the polyester can be scraped flush, and the whole lid sanded through to 320-grit.

Finishing & lining

Finish the box with three coats of Danish oil, de-nibbing between coats with 1000-grit paper dusted with talc. After the final coat, de-nib and knock back the shine with Webrax or fine wire wool, then wax the box and buff it to raise a sheen.

I lined the box with a grade-A pig suede – a task that sounds tricky but calls for nothing more than some card (which is used to back the suede), double-sided tape, and fresh scalpel blades. The lining sequence begins with the sides followed by the base and the lid.

Cut the card to the same length as the box's long sides, but about 1.5mm shorter than their height. Cover one side of the card in double-sided tape, lay the suede on top, and then trim it back to within 0.25mm of the ends of the card, which will give you a margin just in case you've cut the card slightly short. The suede at the top and bottom of the card, however, should be trimmed well oversize so that you have enough spare suede to fold over and secure on the back of the card with more double-sided tape. After testing the fit of the trim panel, and adjusting its length if necessary, glue it in place with latex glue. Make the trim panels for the other three sides in the same way.

When it comes to the panels for the lid and base, take your time testing and trimming them to get the perfect fit; to help lift the panels out as you fettle them, drape a length of ribbon across the box before fitting them.

Once you're happy with their fit, glue the final trim panels into place and then make the tray support steps, which are simply 6mm MDF covered in suede and then glued into place.

TIP

If you get any latex glue on the suede, let it dry before teasing it away with a fine pin; you'll find that it comes away cleanly and quite easily.



▲ Pic.4 The banding is fitted with polyurethane glue and held in place with masking tape while it dries

The trays

Measure for the lower and upper trays, allowing about 1mm clearance all round to provide a smooth sliding fit. The bases of the trays are made from 3mm MDF, which again is veneered on both sides with rosewood so as to resist distortion. The sides and dividers, meanwhile, can be made from any contrasting hardwood but I used Indian rosewood which I was fortunate to have been given a few years ago.

The joint used to assemble the tray frames is a rabbet joint reinforced with stainless steel rods, which are epoxy'd into place. Once you've cut the joinery, then sand the show side of the base and rout the base groove, using the same method employed on the main box. Then finish the base, glue up, and assemble the trays.

Once dry, drill the holes for the rods – which should be cut slightly short so that they sit more or less flush – and glue them into place

using epoxy. The dividers are fitted next and, once dry, are sanded flush with the sides. To finish, apply several coats of sanding sealer which is cut back with wire wool, and topped off with wax. The trays' lining is made in the same way as before, with the exception of the padded slot of the ring run, which is made by covering two strips of 3mm MDF with sponge and suede.

Finishing touches

To mount the escutcheon, position it carefully by hand and then apply strips of masking tape around it to define the glue area, from which you'll need to remove the finish either by sanding or scraping. Once you've worked back to fresh timber, sand the back of the escutcheon and glue it into place using a small amount of epoxy. Finally, when you fit the rest of the hardware, remember to use new screws and align the slots – small touches, it's true, but they make all the difference in a project such as this.

Contact

If you have any queries about this build, or would like to let Ian know how you got on with your box or hinge-fitting, contact ian@hawthornecrafts.com or call him on 02890 836987. He can also supply the nickel-plated hinges shown. For more visit www.hawthornecrafts.com.



▲ Pic.1 Ian's hinges act like quadrant hinges, holding the lid open at 95°, but without any awkward mortising or clumsy stay arm



▲ Pic.2 Once the lid has been separated from the base, the sawn edges can be cleaned up using a sanding board or a spiral bit in the router table



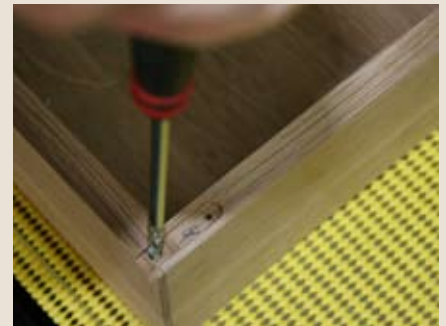
▲ Pic.3 Measure the barrel of the closed hinge and divide by two to determine the depth of cut necessary to house it in the base and lid



▲ Pic.4 Ian uses a block sized to match the length of the hinge mortise to set the stop on the router table fence accurately



▲ Pic.5 When you've cut the hinge mortises, tape the hinges into place in the lid, then fit the lid to the base to check their alignment



▲ Pic.6 To make the hardware as aesthetically pleasing as possible you should endeavour to line up all the screw slots

How to perfect hinges

The hinges that I use, when opened, keep the lid at 95°, **Pic.1**. In this respect, they're similar to quadrant hinges, but without the need to mortise that awkward L-shape, and with no stay arm either. This means that they're much easier to fit, needing only one pass on a router table fitted with an 8mm bit.

That said, there are always a number of factors involved in fitting a hinge, and therefore a number of things that can go wrong. It's important, then, to take your time; I allow about an hour and a half from start to finish, and more often than not this is still enough. Your aim should be for every hinge to fit as perfectly as possible. And while this sort of accuracy only comes through practice and experience, the following procedure will help to improve both your speed and the fit of your hinges.

1 Once the lid has been separated from the base, I like to leave both to settle for several days. Then clean up the sawn faces using a sanding board or a spiral bit in the router table (**Pic.2**) followed by some very light sanding with a handheld sanding board.

2 Set the lid down on the base to see whether the sides align all the way around. Some distortion is normal, but it's usually very slight and can be dressed out by sanding; use masking tape to hold the lid and base together while you're working.

3 Measure the thickness of the barrel with the hinge closed (**Pic.3**) and divide by two to obtain the depth of cut necessary to house the hinge: if you cut too deeply, there will be

a gap at the front of the box; if you don't cut deep enough, you'll have a gap at the back. Getting things spot on, however, is tricky; it only takes a change in the pressure with which you hold the work on the router table to alter the depth of cut. My tactic is to err on the side of a deep cut by about 0.15mm, then shim the hinge with masking tape to get the height spot on.

4 Measure the width of the leaf. The hinges that I use have 8mm leaves, which I subtract from the thickness of the box's wall, 12.5mm, dividing the answer by two to determine the offset between the fence and the router bit – 2.25mm in this case. I'd suggest that you use a low fence in case your box is slightly off 90°; there's thus less chance of cutting from a skewed reference.

5 Fit the router with an 8mm bit and make some test cuts in scrap MDF with one true edge until you've got the setup spot on. I favour down-cut spiral bits for this as they leave clean edges, though a straight bit will do the job providing you make several passes to avoid tear-out.

6 Use a wooden block sized to match the length of the required mortise to set the distance between the stop on the fence and bit, **Pic.4**.

7 Identify the back of your box with masking tape and cut the mortises in both the lid and the base. Now check to see how well the hinges fit them, and how well the lid and base align. If all's well, mark the hinges on their underside so that they go back into the correct mortise, and then slide the hinges fully into the lid mortise and tape them into place, **Pic.5**. Close the hinges and fit the lid to the base so that hinges slot into their base mortises. Push the hinges fully into

their mortises and check the lid and base for front-to-back fit. If there is any misalignment, all is not lost: move the fence stop a fraction and re-route the mortise to achieve a good fit.

8 Now the screws. You can fit these by simply eyeballing the centre of the hole, but I find it more accurate to tape the hinge in place and take it to the drill press – ideally one that has an auxiliary table with a fence to which you can clamp the box. Use a piece of rod of the same diameter as the hinge hole, or a drill bit held upside down in the chuck, and lower the spindle into the hole. Adjust the position of the box until there is no deflection of the rod, which will mean that you're hitting the hole dead centre. Then clamp the box in place and remove the hinge.

9 Fit a centre starter in the chuck, lightly touch it to the wood, then fit the drill bit and make the hole. Repeat this operation for all the screw holes. The extra care is worth it.

10 Use machine screws, which are stronger than standard screws, to tap a thread in each hole without the hinge in place. Some candle wax helps to ease the cutting, and to make the hardware as aesthetically pleasing as possible you should endeavour to line up all the screws. Start tapping each hole with the screw slot set one quarter turn before its finishing position, **Pic.6**. When you've cut the threads for each hole, use the old screws to fit the hinges to the lid and base while you finish the box but, when all the work has been done, replace them with a new set of screws. ↙