



10 simple steps to multi-axis turning

Terry Scott creates a multi-axis cedar plate and explains the 10 key steps and techniques to apply for multi-axis and out-of-balance turning

I recently had a request from a customer to make a seder plate that he could display as a centrepiece in his home, and use in the Passover celebrations. After some research I discovered this piece has a historical meaning, which makes it even more enjoyable to make. The seder plate is a special vessel containing symbolic foods used by Jews during the Passover Seder. For more information see: http://en.wikipedia.org/wiki/Passover_Seder_Plate.

From my research I found I had to make a plate with either inserts that six pottery bowls could be placed into, or one with six recessed bowls. I

could have just drilled six holes with Forstner bits and added bowls, but I like a challenge. I really enjoy turning off-centre and out-of-balance work. I realised that irrespective of what projects require off-centre or more than one centre, there are some key factors that will help you achieve great results more easily, cleaner and safer. So I have put together the key techniques I use for this type of work.

Much of my turning is done with out-of-balance pieces that require more than one centre to be turned. Due to the boundaries I push, and recent pieces I have been making, it has become very necessary to counter-balance work so there is less stress

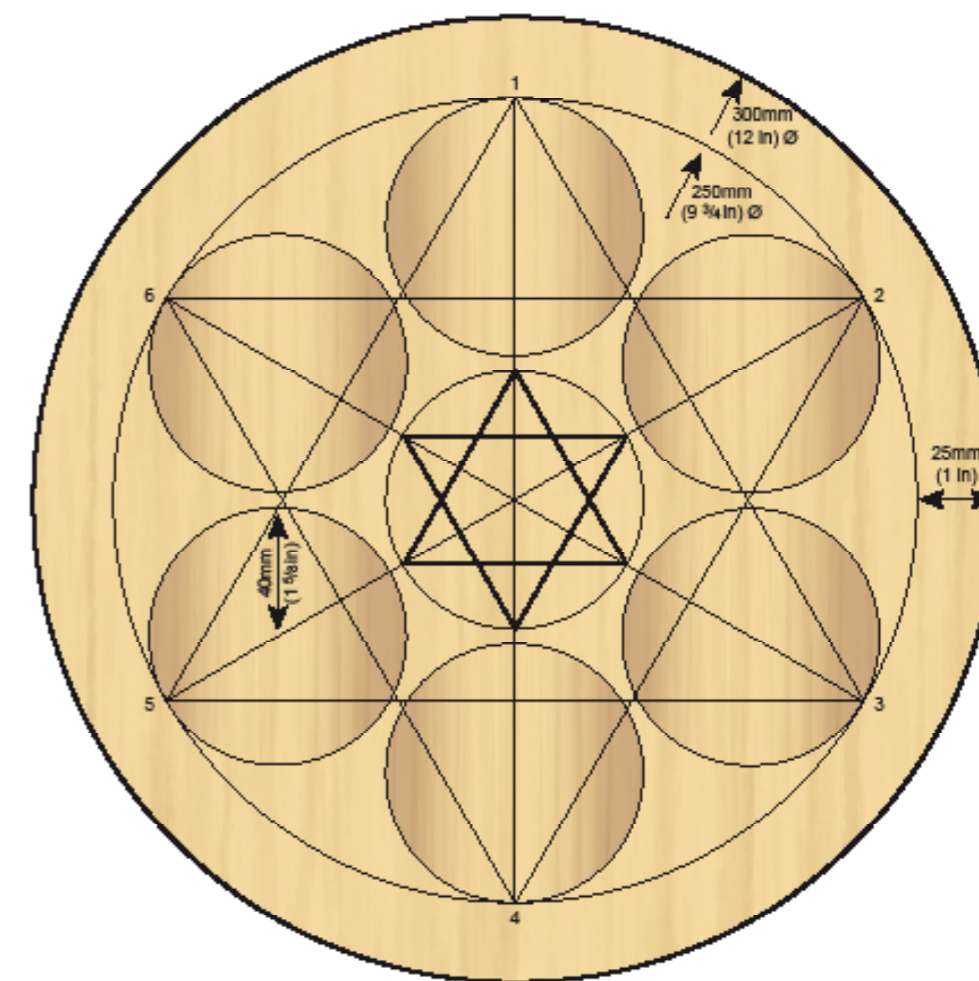
on my lathe and, more importantly, myself. Things that can happen is the possibility of damaging the lathe bearings or bending your headstock out of alignment. Out-of-balance work can also alter the direction of centrifugal force causing a piece to place stress on the fixing points, whether it be chuck held or by any other method.

Another advantage of good balancing is that the speed can be turned up and increased. To help the chisel skip the gap between edges of the work being turned it is necessary to get speed up to a suitable clip. A better cut is achieved meaning less torn grain and sanding.

MULTI-AXIS TURNING DIMENSIONS

STEP 1: DRAWING

The first step in tackling this sort of project is knowing exactly what you are going to make and having precise measurements of what goes where. Yes, with some types of off-centre turning you can wing/freestyle it to create off-centre stems and body shape forms etc. which is very skilful in itself, but as with this platter and similar projects, some things need to be in very specific places. As such, a scaled or full-size drawing – as opposite – is



STEP 2: PREPARATION

Make sure that you prepare the timber you are about to use accurately and cleanly. The more accurate you are in your preparation and turning, the less you will have to make adjustments later on. Many pieces will require the front and back to be turned and much of the initial work can be done on standard chucks, faceplates, between centres and glue chucks. I use a combination of all of these, as necessary. But in the case of

this piece I used a between centre method for turning the underside inclusive of a small spigot which is used to centralise the piece in the next stage. Also, check the lathe is stable, and on a good solid base before you start the project. Remember I mentioned that the work is out of balance? Everything needs to be properly secure and as well constructed as possible in order to minimise vibration. Once this is done, transfer/mark all the offset designs onto the piece.



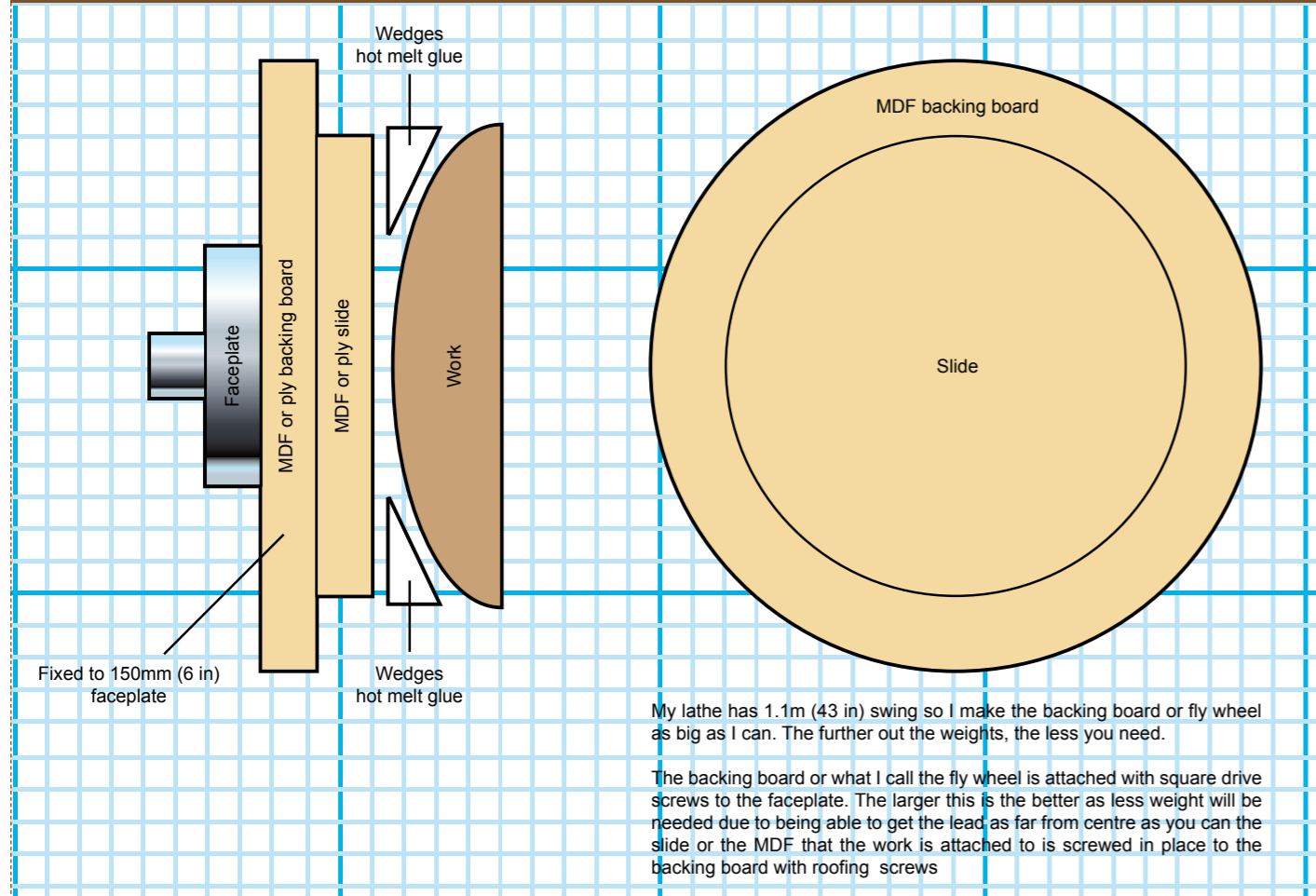
BELOW: Between centres holding method

STEP 3: CREATE AN OFF-CENTRE SLIDE

Set the now finished back of the plate – apart from tidying up the spigot and foot later – onto what I call a slide, or a piece of MDF. I left the small spigot that was where the live centre was against the bottom. Drilling a hole of the same size in the MDF helps centralise the plate on the slide and also gives it some support against the centrifugal force. Using hot melt glue, firstly add glue to the foot. If you are having trouble getting the plate stuck before the glue goes off, load the spigot and then re-heat the glue with a heat gun until an even melt is achieved. Glue the plate on by its base then level it up with wedges and more hot melt glue. Use two sticks to hold this plate in place. Seal the piece flat and use a steel rule to measure around the plate rim back down to the MDF, to check that it is level.

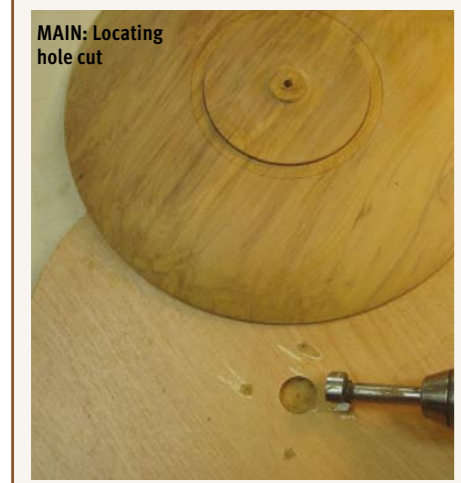
Next, make what I call the flywheel or backing board, attached to a good, big faceplate. Use MDF – or ply is better as it doesn't flex as much – and the slide holding screws (40mm roofing screws) grip better in ply and don't form a bump as they do when removed from MDF. I usually make these flywheels as large a diameter as my lathe will spin. They can be used again for other projects. The extra size also makes weight

OFF-CENTRE SLIDE CONSTRUCTION



STEP 3: CREATE AN OFF-CENTRE SLIDE (CONT.)

attachment easier. Make sure this flywheel runs perfectly true. Hold or lightly clamp the slide, with plate attached, to the flywheel. Bring up the tailstock onto one of the bowl centres. Mount the slide securely to the flywheel with at least four 6 x 40mm (1/4 x 1 1/2 in) screws. Normal screws can just shear off but the Tek screws can be used many times over. The work will naturally hang heavy-side down. Add counter-balance using lead – flat sinkers work well – until you can rotate the work and it stays stopped without support anywhere around 360°. The further away from the workpiece you can place the counter weight, the less lead you will need. This sometimes takes longer to get the balance right than does the turning, but the effort is well worth it. After a while you gain a sixth sense as to where and what weight to add to the centre slide. If you do not get this right the first time, just start again, as the time spent makes the work not only easier to turn if your lathe.



MAIN: Locating hole cut



MAIN: Wedges to stabilise the work



MAIN: Tailstock used to align the work

STEP 4: SECURE FIXINGS

It is important to make sure all aspects of any off-centre holding device and work is secure and stable before you start turning the project. So whatever method you use to hold, make sure the necessary holding device is secure and holds the work in place. Make sure that everything is securely fixed and no unnecessary pieces are sticking out that can catch you as the piece is rotating.



MAIN: The piece securely fixed to the back-board

STEP 5: ROTATE THE WORK BY HAND BEFORE SWITCHING ON THE LATHE

Once the piece is secure and in the position you need it to be in, rotate the work by hand before you start to turn to make sure everything is clear of the lathe and the toolrest. Never adjust the rest whilst the work is rotating and make sure you keep all body parts out of the way of the spinning work.

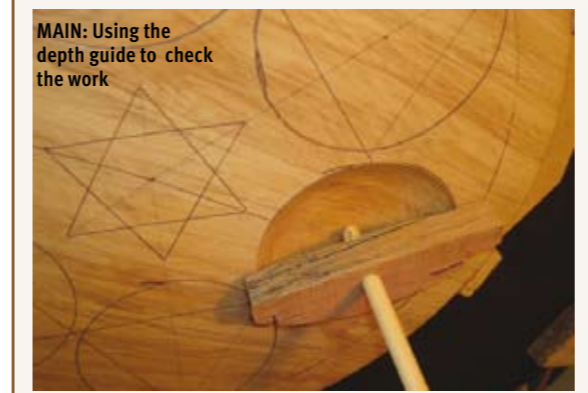


STEP 6: VIBRATION

Vibration is a killer no matter what kind of piece is being turned. I have already mentioned needing a sturdy base for the lathe, but another factor that will help is a wide variety of speeds. Variable speed control is very handy with this type of work, as the micro adjustments in speed help no end with minimising vibration. It isn't, however, totally necessary – just start at a low speed and adjust upwards until you can make a clean cut safely with minimum vibration occurring. The more out of balance the work, the more adjustment is likely necessary to find that sweet spot.

STEP 7: MEASURING & JIGS

You have spent a lot of time marking out and making sure everything is secure so take time to measure as you go along, too. In this case, the hollows need to be an even depth. To that end I cut a jig that doubles up as a depth-gauge shaped template so all the bowls are exactly the same, well near enough anyway. Remember that four legs of a table cannot all be seen at once.



MAIN: Using the depth guide to check the work

STEP 8: CLEAN UP EACH SECTION AS YOU WORK ON IT

Depending on what you are off-centre turning it is highly likely that you cannot effectively back track to sand the pieces once the location of the work has changed. It is far easier to sand each section turned to its finished state before you move on to the next phase. With this piece there is a certain amount of repetition, repositioning the piece each time requires care and careful checking for security of fixing. Continue around the piece by removing the slide from the flywheel, aligning with the tailstock, and re-balancing for each of the six bowls. I normally work around the piece in a clockwise fashion, probably as I am right-handed, but it doesn't really matter which way you work. Do not become complacent; the work is still off-centre and you need to be careful here.



MAIN: Move to each new location in sequence

SKILLS & PROJECTS

Multi-axis turning

STEP 9: ONCE THE OFF-CENTRE TURNING IS FINISHED

Once all the off-centre aspects have been turned, re-centre to the original position and gently sand the main top surface that is left. This is best completed with the lathe stationary using a large diameter orbital sander. This helps to clean up any errant fibres and

cleans off the top face of the piece nicely. Make sure you don't soften or blur the boundaries between the face and off-set turned hollows you have previously made.

If you have – as I have – chosen to use hot melt glue as a fixative, you can gently heat the hot melt glue with

a heat gun using the wedges to help lever off the work. Use mineral turps to remove the excess glue. Next, remount the cedar plate between centres on a backing board/jam chuck – or you can use a vacuum chuck – to take off the spigot and finish the foot of the plate.

STEP 10: FINISHING THE WORK

Finishing is a very personal thing, although as this piece is functional, this has a bearing on what finish you decide to use. Any suitable product you deem suitable can be used. But for this platter, I used three coats of lacquer as food will probably be sitting in it for long periods. I find oil finishes can stain or leave white marks if something hot sits on the item. In a gallery situation, oils dull off under overhead lighting and I hate comebacks. If a lacquer piece returns, I give a lifetime warranty on the finish – I don't know if that is the life of the bowl or mine – all that is required is a light sand and to spray another coat on. The lacquer bonds on as it has natural drying agents.

LEFT: Here is the completed cedar plate, complete with six recessed bowls



OTHER PROJECTS MADE USING THE OFF-CENTRE SLIDE

Opposite is another plate, which shows eight different sized off-set bowls, made using the same off-centre technique. If you so choose, you can alter the parameters of where the cuts can occur and create something like this bowl. The designs are only limited by your imagination and what off-set you can have on your lathe.

I have also turned a number of other projects using the off-centre slide. I actually use this for turning quite a few of my pieces and find that this ingenious device offers me many options.



RIGHT: 'Trumpet Tree' made using the off-centre slide. Each bowl/trumpet is individually turned

