



Lathe Bench



Foreword

Please take your time to read through the plans first before making your first cut. Not all plywood (or any sheet goods) is created equally and thus there may be variation in the material you're using.

This is for a Woodfast M305 or Rikon 70-100 sized lathe with extension bed, though will most likely fit other mini/midi lathes too.

These plans are in millimeters (metric), to convert to imperial divide by 25.4. As somebody who is not a "native" imperial system user I can do a straight conversion but it can be difficult to figure out what the correct *fractional* equivalent is.

For example, 684mm is 25.92" or $25 \frac{23}{25}$ " - I don't know if $\frac{23}{25}$ " is considered "correct" or whether that should be rounded up or down.

This stand is based on *Popular Woodworking/American Woodworker's Ultimate Lathe Stand*, from their free/online article at <http://www.popularwoodworking.com/projects/ultimate-lathe-stand>. There are some variations in the design and in the way it's constructed, but not enough to discredit this as being anything but derivative of their design.

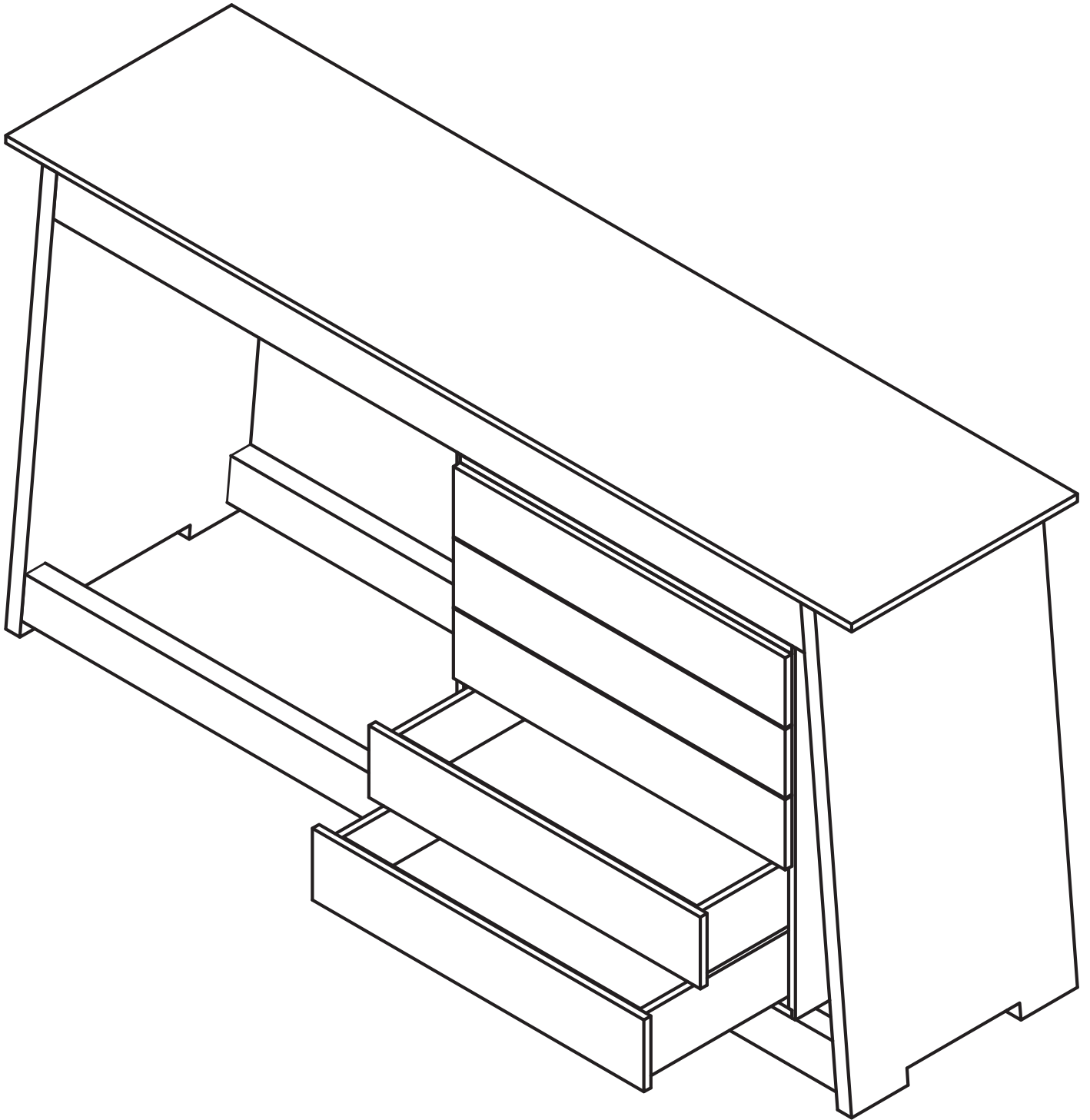
Material List

Item	Quantity	Description
2400x1200x-12mm plywood	3	Structure, drawers, top
2440x1220x-6mm plywood	1	Drawer bottoms
19mm ID copper pipe	Enough to cut 16x36mm lengths (576mm)	"Bench bolt" hardware
M8 x 100mm hex headed bolts	16	
M8 hex nuts	16	
Drawer slides	5	

Tool List

Tool	Specific Use
Table Saw	
Mitre saw	Cutting mitres on stretchers
Circular saw or tracksaw	Breaking down sheet goods, cutting bevels
Drill	
Drill press	
Jig saw/band saw	To cut the "feet" on the two leg panels.
Pipe cutter	
Bevel gauge	
22mm Forstner Bit	
9mm twist drill bit	

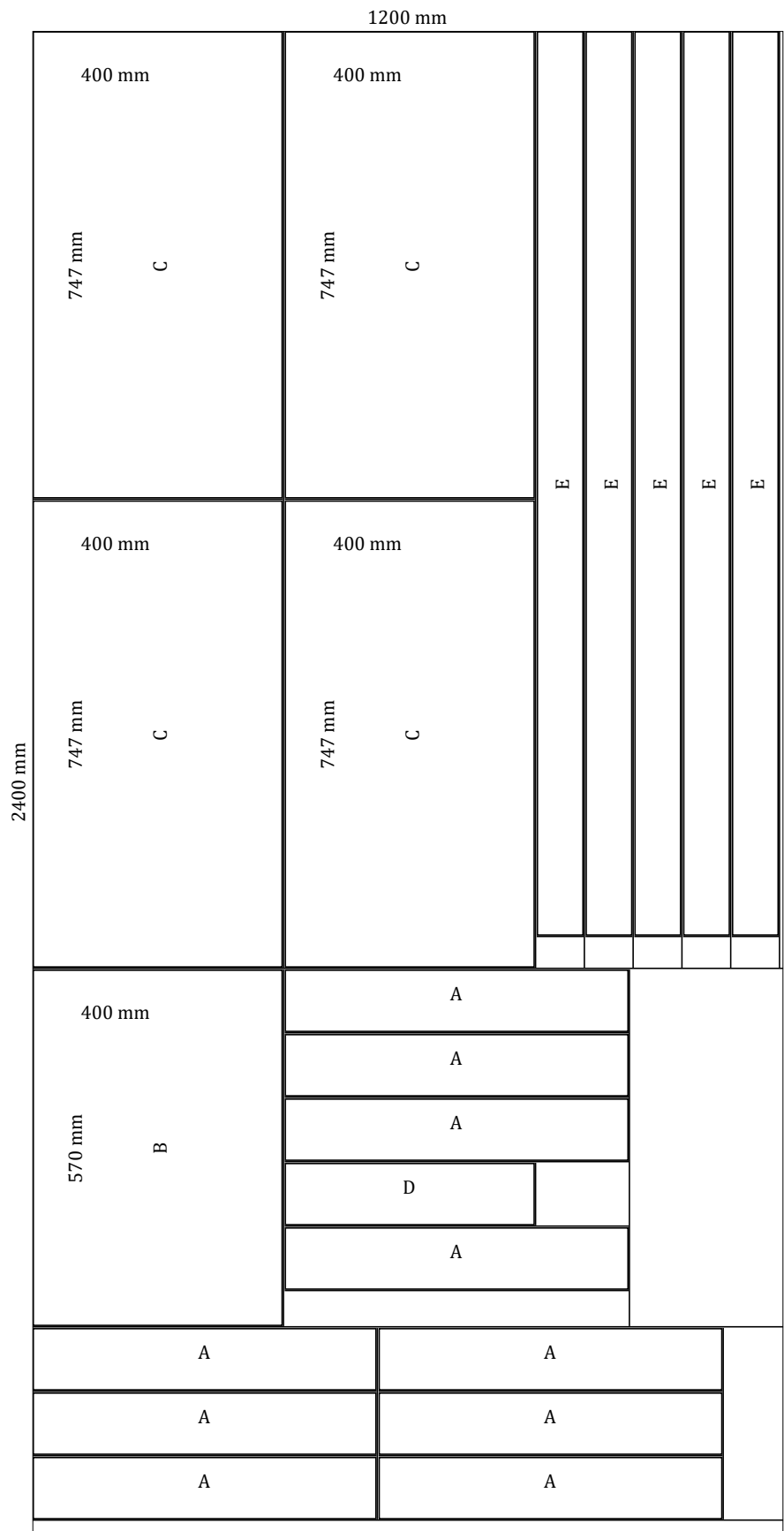
Assembled View



Cut List

Sheet Size : 2400 mm x 1200 mm x 12 mm

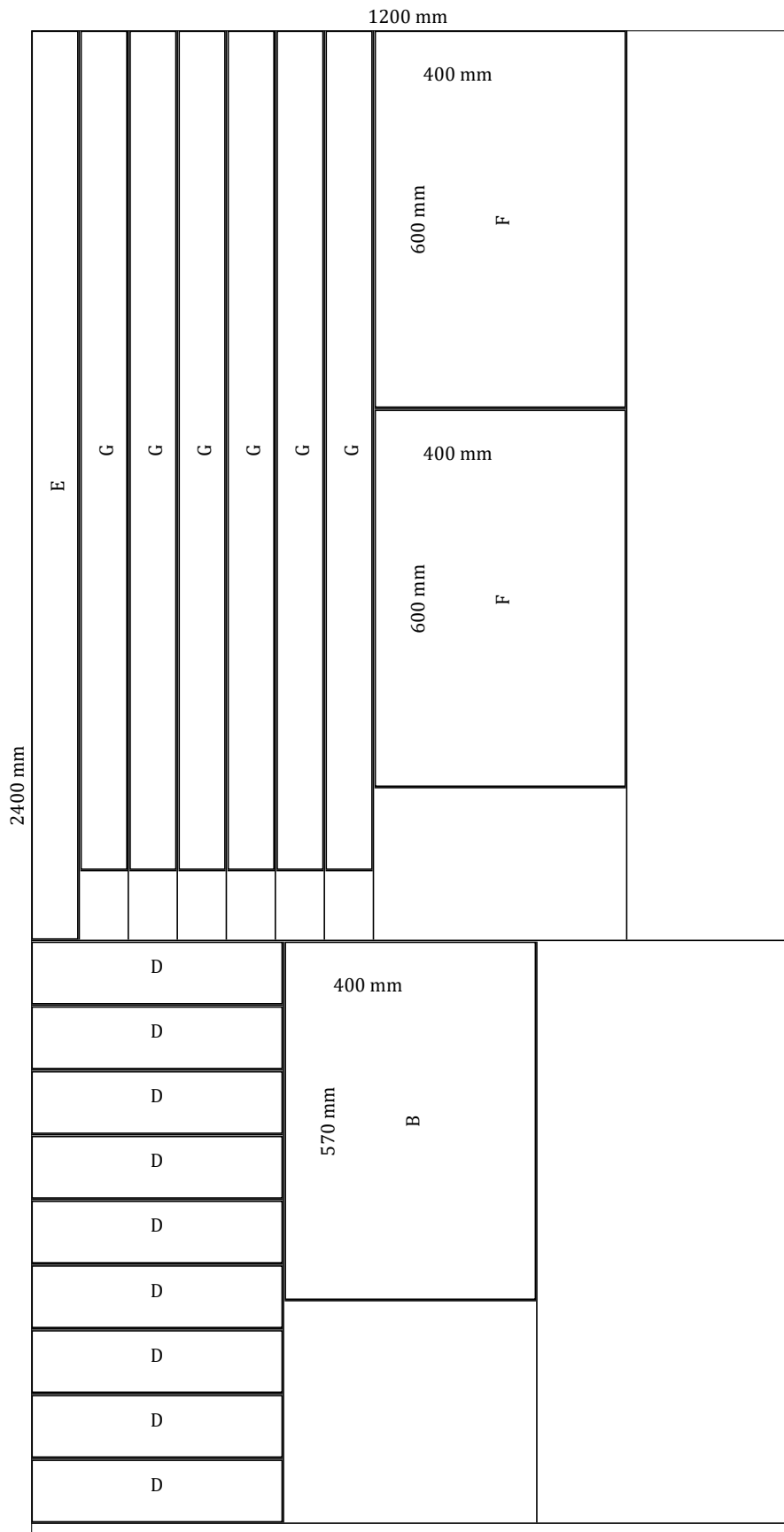
Cutting List			
Symbol	Length	Width	Qty
A	100 mm	550 mm	10
B	570 mm	400 mm	1
C	747 mm	400 mm	4
D	100 mm	400 mm	1
E	1446 mm	75 mm	5



Sheet Size : 2400 mm x 1200 mm x
12 mm

Cutting List

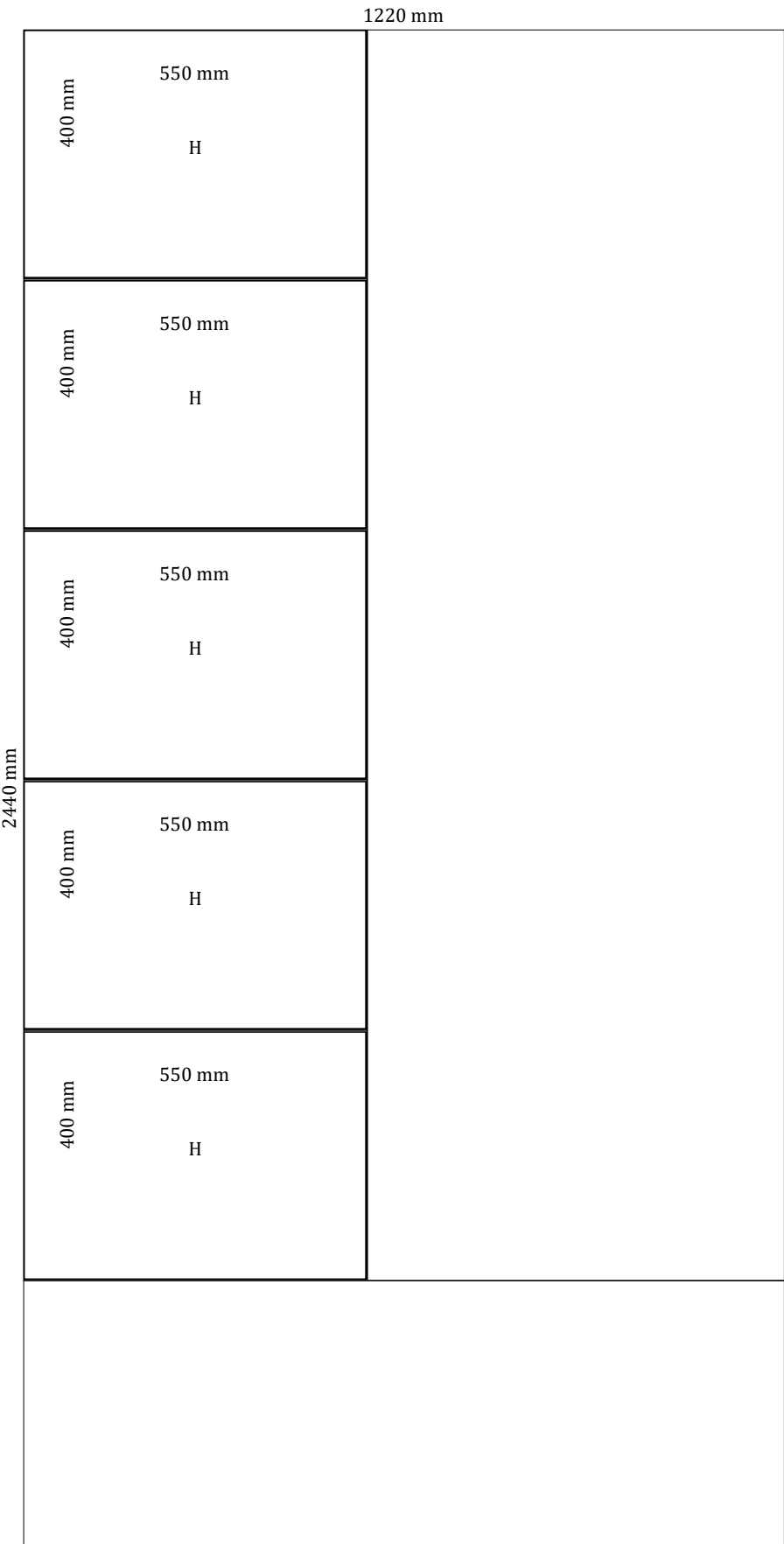
Symbol	Length	Width	Qty
B	570 mm	400 mm	1
D	100 mm	400 mm	9
E	1446 mm	75 mm	1
F	600 mm	400 mm	2
G	1335 mm	75 mm	6



Sheet Size : 2440 mm x 1220 mm x 7 mm

Cutting List

Symbol	Length	Width	Qty
H	400 mm	550 mm	5



Legs

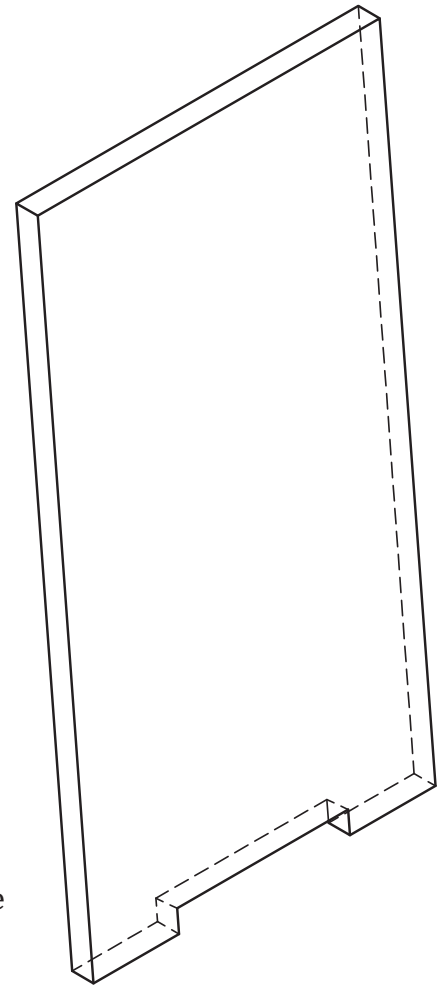
To provide more rigidity, each leg will be two layers (C) laminated together to form a 24mm/1" thick leg.

Laminations like this can be tricky to get even pressure as its very unlikely you'll have enough clamps with the required throat depth. Instead, weights are generally used - cast iron hand planes, or even 'small' machines such as thicknessers, bench sanders, etc can all be used. As we will be painting the legs, we used screws to act as clamps.

If you're not painting but don't have enough weights to place down, consider using screws from the "inside" face, which can always be removed later and won't be seen.

After the glue is dried, the legs can be cut to final shape.

1. Use a tracksaw, circular saw or table saw with a cross cut sled/mitre bar to bevel the top and bottom of the legs at 5°. Flip and rotate so that the cuts are going the same way - the bevels should make a **parallelogram**, not a trapezoid.
2. Using a jigsaw or bandsaw, cut out the feet. Having two points of contact (rather than a single long edge) per foot is easier to balance and get level.



Stretchers



Much like the legs, the stretchers are made of laminations to provide rigidity and strength. Laminate three layers for each stretcher (E & G). The top stretchers are longer than the bottom stretchers.

After the glue is dried, the stretchers can be cut to final shape.

Use a mitre saw to cut a 5° angle on the ends of every stretcher. You should end up with a **trapezoid**, not a parallelogram

Assembly/Joinery

With everything cut to length/angles, its time to do a dry fit. The bottom stretchers will come up 25mm from the ground, while the top stretchers will come up flush with the top of the leg. Either clamp or drive a temporary screw through the leg into each stretcher - the latter is easier to work around and is quicker to undo/reassemble as we need to do a few dry fits.

1. On each stretcher, strike a line 25mm in from the top and 25mm in from the bottom.
2. Transfer that line across to the face of the leg.
3. From the edge of the legs, come in 18mm and strike a line vertically to intersect with the lines transferred from the stretchers.
4. Remove clamps/screws and disassemble the bench.
5. Setup the drill press table tilted to 5°, and using a 22mm forstner bit drill a shallow pocket to recess the head of the bolts on the marks you've just made. That should be 8 holes per leg. Do not go all the way through.

You're aiming to create a flat for the bolt head to register against once the bench is assembled, so the "shallow" edge of the hole (since its on an angle) should be facing "up" on the leg.

Unless you have have a massive drill press, you'll likely need to switch to -5° to drill all the holes.

6. Switch to a 9mm twist bit, and drill all the way through the center of the holes drilled in #5, still at the 5/-5° angles.
7. Clamp/screw the bench together for another dry fit.
8. The bolt holes need to be transferred into the stretchers, the best way is to drill through the 9mm holes into the stretcher. Using a bevel gauge set to 5° as a guide, drill a hole approx 25mm into the stretchers.

Note: some of these in the video are extremely wonky because Natalie's unfamiliarity with the bevel gauge meant she put it upside down a few times, giving her a 5° angle the opposite direction, or 10° off from what she meant!

9. Remove clamps/screws and disassemble the bench.
10. Extend the holes in the stretcher to 80mm deep.
11. Remove the drill bit from your drill, and mark a line on the shank. Insert the drill bit back into a hole in the stretcher, and using the line on the shank as reference, draw a line on the stretcher 80mm in, mark the end of this with an awl.

This is the reference point where you need drill the cross holes. Rinse and repeat for the other 15 holes.

12. At the drill press (with the table reset to 0°), drill through the stretcher on all the points you marked, with a 22 forstner bit.

The easiest way to provide a strong joint that can be tightened if vibration loosens things up is using bench bolts. You can buy “bench bolts” (see: Veritas Special Bench Bolts), but making your own isn’t too tricky.

1. Take a length of copper pipe, and mark out every 36mm (the thickness of the stretchers) then cut using a pipe cutter (preferable), hacksaw, or angle grinder.
2. Tap the 36mm copper pipe pieces into the holes using a mallet or using a clamp to force it in
3. Using the 9mm drill bit again and drill through one side of the copper pipe through the holes in the end of the stretchers.

The joinery is now done! Bolts go through the legs, into the stretchers, and the nut is captured in the copper pipe.

Drawer Case

The drawer case is just a large box. We used rabbets to join it, but butt joints reinforced with nail, screws, biscuits or dominoes will all work.

To add additional strength, attach a back. 6mm MDF will work just fine here, it’s to stop racking rather than taking the weight.

Either size the drawer case to the drawers or visaversa - the joinery and drawer slides you use will effect the overall dimensions.

Drawers

The drawers will sit in a cabinet, which will sit on the bottom stretchers. This box will add more weight and help dampen vibration further.

1. Cut box
2. Cut rabbets
3. Glue/tack/screw together

Drawers can be made in any number of ways - we chose to use box joints, but there are many ways depending on your tools and skill levels.

There are so many different ways to make drawers, including (but not limited to)

- pocket holes
- floating tenon (Dominoes)
- Locking rabbit joint
- Dovetails

These methods are outside the scope of these plans.

If you're using full extension slides, *typically* these require the outside width of the drawer to be 25.4 (1") less than the width of the cabinet they're going into with +/- 0.5mm tolerance. Make sure you check the label or with the manufacturer of your particular brand drawer slide.

If you're under, an easy way is to add shims (either to the drawer box or the cabinet). If you're over, you can just use the tablesaw to slice off ~0.5mm at a time. This can be tricky/dangerous if you've used nails to tack together the drawer while the glue dries.

Finish

Obviously the finishing choices are up to you, however I'll go through what we used to finish the bench.

At a minimum, however, I would recommend finishing the top of the workbench. Turning creates an enormous amount of dust and debris, and having a finished surface makes it much easier to clean.

Milk Paint Recipe

For more information, check out episode [093 - How To Make Milk Paint](#)

Ingredients

- 1.5 L skim milk (it does matter)
- 192 ml vinegar
- 42 g hydrated lime
- 96 ml water

If you're using oxide or powdered pigments for your colour, approx 72g oxide with 72ml water.

Method

1. Add milk and vinegar to a saucepan, lightly mixing (but not more) the mix.
2. Turn on the heat to a low setting, you don't want it above 46c or "until just a wisp of steam"
3. Wait for ~5-10mins for the whey and the curds to separate. The whey around the edges should start going pretty clear
4. Transfer the curds into a colander lined with doubled over cheesecloth.
5. Rinse the curds several times – you want any remaining vinegar to be cleaned off so it doesn't react later on.
6. Watch as your paint recipe disappears as your wife realises you've just made cheese
7. Measure out and mix the lime and water in a separate container. It doesn't take too long for it to become a smooth paste.
8. Add the curds into the lime paste, mix like crazy
9. For the smoothest paint possible Strain through a stocking
10. In a separate container, mix up the oxide powder and water until its 'all wetted'.
11. Combine the wet oxide powder into the curd+lime mix, mix until smooth
12. For the smoothest paint possible Strain (again!) through a stocking. The oxide powder may have introduced new lumps
13. Done. Paint stuff. I used a synthetic bristle brush, washes out super easy.
14. Excess paint can be stored in the fridge for at least three days.

The milk paint can be left as is, or coated with a top coat to add more protection. Shellac, BLO, or polyurthane are all absolutely OK. We opted to add a single coat of MinWax' Polycrylic, a water based acrylic varnish. It dries quickly, is low on fumes, and is easy to clean up.

Black plywood

The black plywood we used on the drawer fronts and bench top is 'phenolic coated plywood' - that's a layer of paper glued onto the plywood, and then a phenolic resin is poured on top. As such it creates a non-stick surface that doesn't really need finishing at all.

The particular plywood we used is 'formply' designed to be used to create reusable moulds for concrete forming. You can also get more "furniture grade" phenolic coated plywood, though it's generally more expensive as it uses baltic-birch.

Though it didn't need any finishing, we opted to add a single coat of MinWax' Polycrylic.

Attaching the top & lathe

Drill through the top stretchers in at least four locations, then drive a screw up into the top. Use a washer or a wider head screw (truss/pan head) for extra holding power.

Alternatively you can just bolt through the top, if you don't mind exposing the bolts.

If your lathe vibrates around at all, set it in position and mark out for bolts through the lathes legs/mounting points. Remove the lathe, drill clearance holes, then reposition the lathe and attach with hex head bolts and nuts.