DuraGrain Maker Plan Library: Shop Jigs

5 projects · CNC router and Laserbox · inches · Recommended Finish: DuraGrain Hardwax Oil & Pure Walnut Oil

Projects

#	Project	Machine	Stock
1	Router Bit Holder	CNC router	6/4 hardwood planed to 1-1/2" (or two 3/4" boards glued), 9" x 3-1/2"
2	Push Shoe	CNC router	3/4" plywood or MDF, 12" x 11" for two
3	Featherboard	CNC router	3/4" straight-grained hardwood (ash, oak or hard maple), 9" x 3"
4	Clamp Rack	CNC router	3/4" plywood, about 24" x 14"
5	Radius Gauge Set	Laser	1/8" (3 mm) plywood or acrylic, one 14" x 10" sheet

Before you cut

Measure your stock. The dado in the clamp rack is sized from CNC_T and FIT at the top of *jigs.py*.

Grain matters for jigs. The featherboard fingers and push-shoe heel need grain running left to right as drawn; CNC parts are never rotated in the files, so place the blank that way.

CNC files for VCarve (DXF, inches)

Import: create the job in inches with Z zero on the material surface, then File > Import Vectors and pick the DXF. The layers come in by name.

Smooth the curves: curves are exported as fine polylines. Select all and run *Fit Curves to Vectors* (arcs, tolerance about 0.002") before toolpathing for smoother cuts and shorter G-code.

Toolpath by layer: in the Layers panel, select a layer's vectors and create the toolpath listed for it on the project page. Each project page lists the toolpaths in cutting order.

Layer names give the operation and depth: **PROFILE_OUTSIDE_0.750** (cut outside the line, through 0.750"), **PROFILE_INSIDE_0.750** (cut inside, through), **POCKET_0.375** (pocket to that depth), **DRILL_...**. Paths are on the line; leave tool offset to the CAM.

Parts are nested on a 38" x 38" area to leave room for hold-downs, and keep the orientation they are drawn in, with the grain running left to right. Parts from different stock thicknesses go in separate files (named with the thickness): each is its own VCarve job.

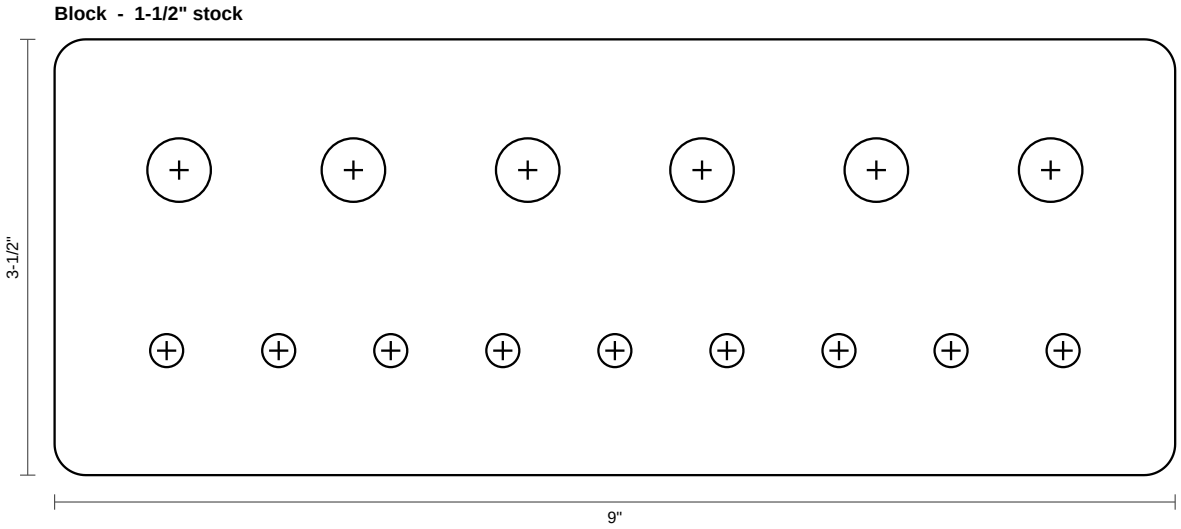
Underside operations come as a separate **-underside** file, mirrored as you'll see the part after flipping it, with the part outline on a REFERENCE layer for registration.

Laser files (SVG and DXF)

Laid out for a 14-1/2" x 10-1/2" area, inside the Laserbox bed. Red lines cut, blue lines and text engrave. Projects that don't fit on one sheet come as numbered sheets.

1. Router Bit Holder

Holds nine 1/4"-shank and six 1/2"-shank router bits upright, 1" deep.



Machine & stock

CNC router. 1/4"-shank holes are 0.265" and 1/2"-shank holes 0.51": a little clearance so bits drop in without sticking.

Holes are 1" deep. Pocket the small ones with a 1/8" end mill and the large ones with a 1/4".

Steps

1. Pocket the holes, then profile with tabs.

2. Chamfer the hole edges lightly with a countersink so shanks find them easily.

3. Optional: V-carve sizes or labels along the front edge in VCarve.

VCarve toolpaths (in this order)

Holes, layer DRILL_0.265_DEPTH_1.000: 0.265" diameter, 1.000" deep. Pocket toolpath with the 1/8" end mill (for an exact fit), or a matching drill.

Holes, layer DRILL_0.510_DEPTH_1.000: 0.510" diameter, 1.000" deep. Pocket toolpath with the 1/4" end mill.

Profile, Outside, layer PROFILE_OUTSIDE_1.500: cut depth 1.500" (through), 1/4" end mill, with tabs.

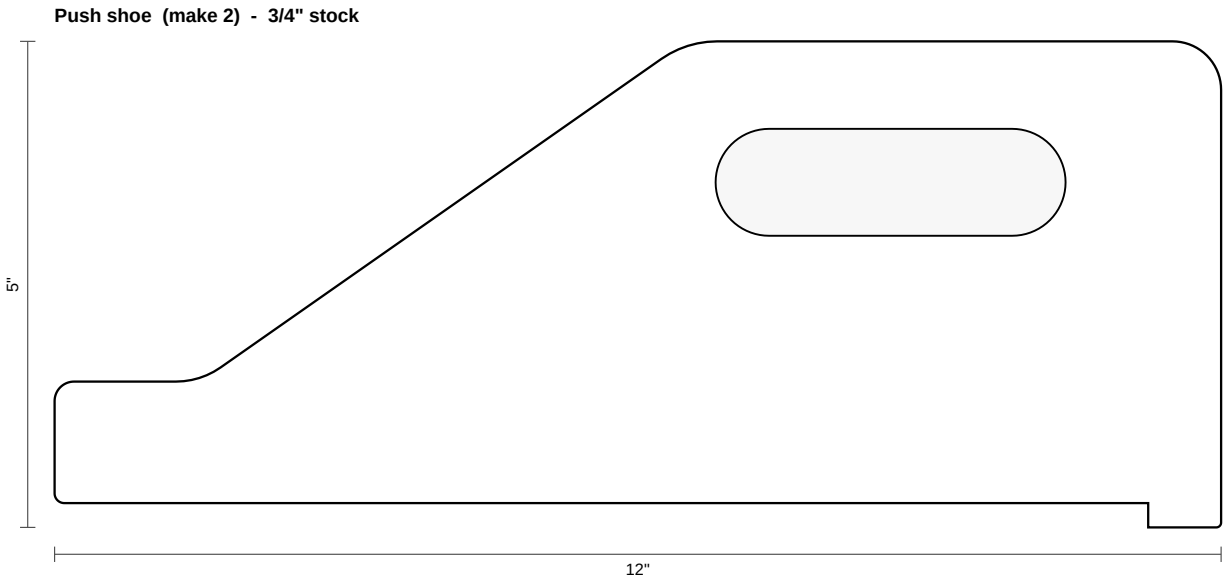
Files

dxf/router-bit-holder.dxf

Plan view, drawn at about 1:1.5. Grey = pocket (depth noted), dashed = underside pocket, light fill = through cut. Cut files are full size.

2. Push Shoe

12" table-saw push shoe: the long sole holds the work down, the heel hook pushes it through.



Machine & stock

CNC router, 1/4" end mill.

The heel hook is 1/4" deep and meant to get nicked by the blade. Make a couple and replace them as they wear.

Steps

1. Profile both shoes and the handle cutouts.

2. Round over the handle edges generously for a comfortable grip.

3. Keep the sole flat and unfinished, or rub a thin coat of DuraGrain Board Butter (T1 Carnauba & Beeswax) onto the sole—it is 100% silicone-free (safe around raw shop lumber) and buffs to a glass-slick glide on cast-iron table saw tops.

VCarve toolpaths (in this order)

Profile, Inside, layer PROFILE_INSIDE_0.750: cut depth 0.750" (through), 1/4" end mill.

Profile, Outside, layer PROFILE_OUTSIDE_0.750: cut depth 0.750" (through), 1/4" end mill, with tabs.

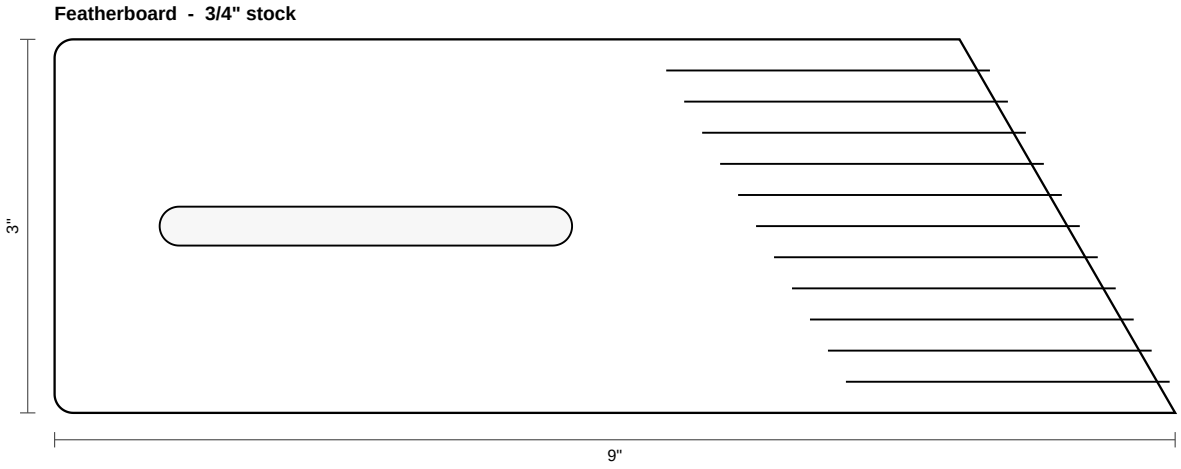
Files

dxf/push-shoe.dxf

Plan view, drawn at about 1:2. Grey = pocket (depth noted), dashed = underside pocket, light fill = through cut. Cut files are full size.

3. Featherboard

Fingers 1/8" thick on 1/4" centers flex to hold work against the fence; the tips are angled 60 degrees.



Machine & stock

CNC router. The kerfs between the fingers are open lines cut *on* the line with a 1/8" end mill, so they come out exactly 1/8" wide. Everything else uses a 1/4" end mill.

Grain must run along the fingers (left to right as drawn) or they will snap.

The 5/16" slot takes a 1/4" T-bolt or a miter-slot bar bolt.

Hardware

1/4"-20 T-bolt (or miter-bar hardware) with a washer and knob.

Steps

1. Cut the kerfs first (on-line profile, through), then the bolt slot, then the outline with tabs placed away from the fingers.

2. Check that each finger flexes freely; clean out any fuzz with a card scraper.

3. Use it angled so the finger tips point in the direction of feed.

VCarve toolpaths (in this order)

Profile, Inside, layer PROFILE_INSIDE_0.750: cut depth 0.750" (through), 1/4" end mill.

Profile, On (no offset), layer PROFILE_ON_0.750: cut depth 0.750" (through), 1/8" end mill. These open lines are the centers of 1/8" kerfs.

Profile, Outside, layer PROFILE_OUTSIDE_0.750: cut depth 0.750" (through), 1/4" end mill, with tabs.

Files

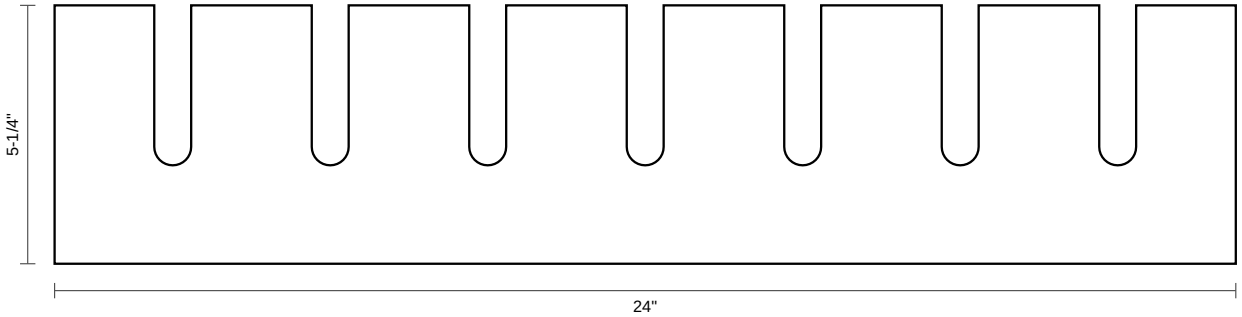
dxf/featherboard.dxf

Plan view, drawn at about 1:1.5. Grey = pocket (depth noted), dashed = underside pocket, light fill = through cut. Cut files are full size.

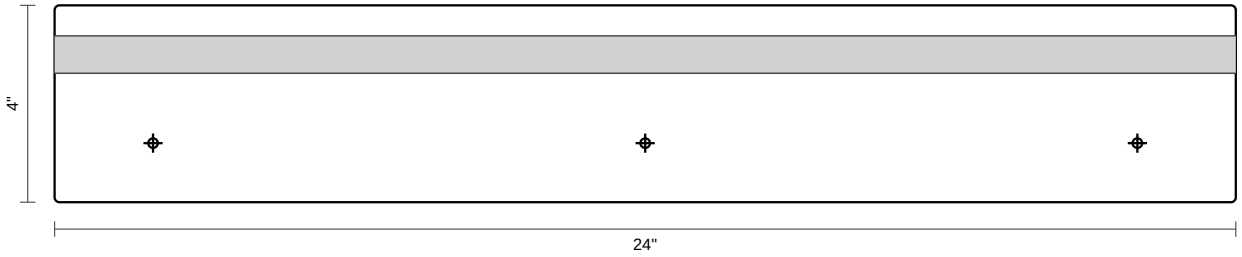
4. Clamp Rack

24" wall rack with seven 3/4" slots for bar, pipe and F-clamps, hung from a dadoed backboard.

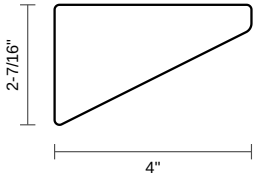
Slotted shelf - 3/4" stock



Back - 3/4" stock



Gusset (make 2) - 3/4" stock



Machine & stock

CNC router, 1/4" end mill. The back's through-dado is 1/4" deep and runs out both ends.

The shelf is 5-1/4" deep: 1/4" sits in the dado, leaving 5" out from the wall.

Hardware

Three #10 x 2-1/2" screws into studs; 1-1/4" screws for the gussets.

Steps

1. Machine the back (dado, screw holes, profile), the shelf and the two gussets.

2. Glue and screw the shelf into the dado, slots facing out.

3. Glue and screw a gusset under each end of the shelf, tight to the back and the shelf.

4. Screw the back to studs through the three holes below the shelf.

VCarve toolpaths (in this order)

Holes, layer DRILL_0.190_THRU: 0.190" diameter, through. Drilling toolpath with a matching bit, or spot the centers and drill by hand.

Pocket, layer POCKET_0.250: cut depth 0.250", 1/4" end mill. Select every vector on the layer together so islands are left standing.

Profile, Outside, layer PROFILE_OUTSIDE_0.750: cut depth 0.750" (through), 1/4" end mill, with tabs.

Files

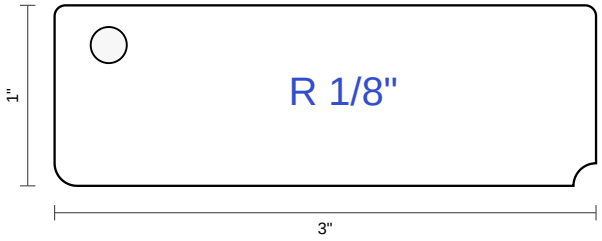
dxf/clamp-rack.dxf

Plan view, drawn at about 1:3.9. Grey = pocket (depth noted), dashed = underside pocket, light fill = through cut. Cut files are full size.

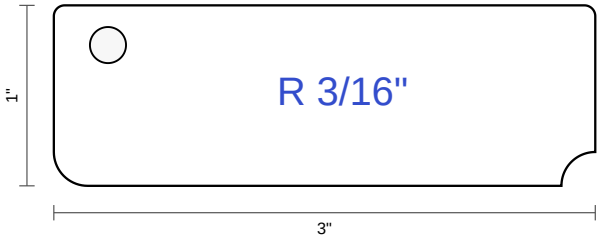
5. Radius Gauge Set

Eight gauges, 1/8" to 3/4". Each has a convex corner (checks inside fillets) and a concave corner (checks roundovers).

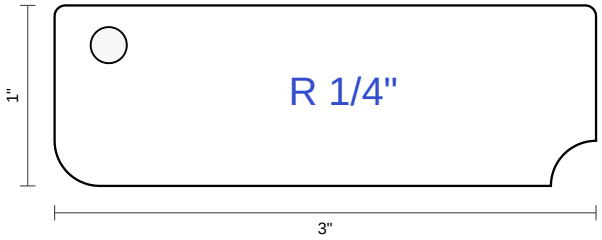
Gauge 1/8 - 1/8" stock



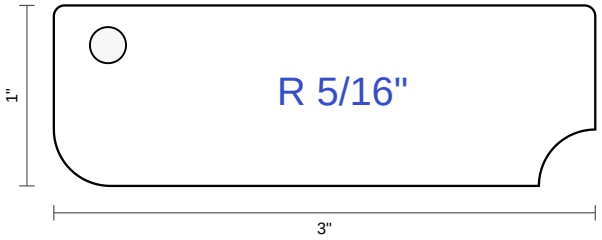
Gauge 3/16 - 1/8" stock



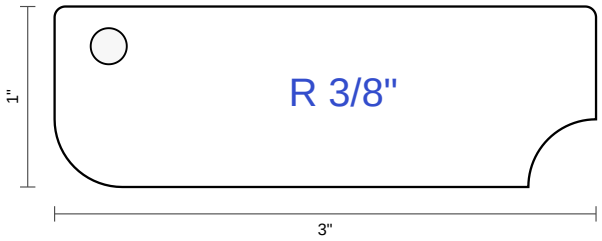
Gauge 1/4 - 1/8" stock



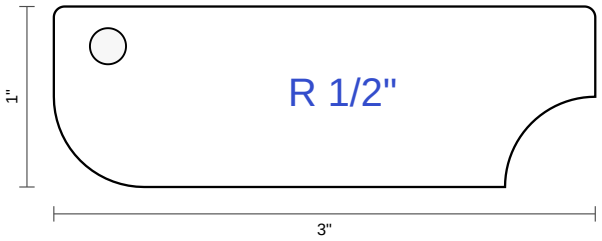
Gauge 5/16 - 1/8" stock



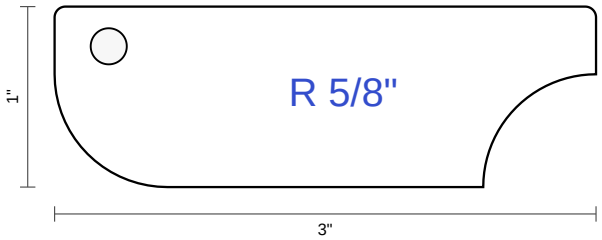
Gauge 3/8 - 1/8" stock



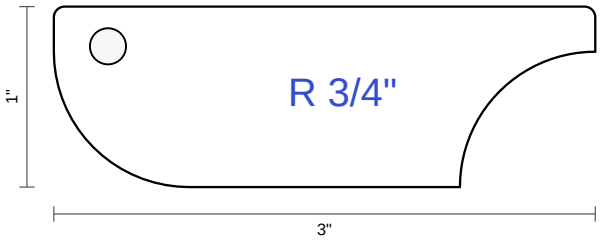
Gauge 1/2 - 1/8" stock



Gauge 5/8 - 1/8" stock



Gauge 3/4 - 1/8" stock



Machine & stock

Laserbox 40W CO2. Red = cut, blue = engrave the labels.

Labels are text in the SVG and DXF. If your laser software doesn't import text, type the labels in it before engraving.

Acrylic works too and lasts longer; kerf hardly matters at these sizes.

Hardware

A 1" key ring to keep the set together.

Steps

1. Engrave the labels, then cut.

2. Check the 1/2" gauge against a known 1/2" roundover bit cut to confirm the scale.

3. Ring them together through the holes.

Files

dxf/radius-gauge-set.dxf, svg/radius-gauge-set.svg

Plan view, drawn at about 1:1.1. Grey = pocket (depth noted), dashed = underside pocket, light fill = through cut. Cut files are full size.