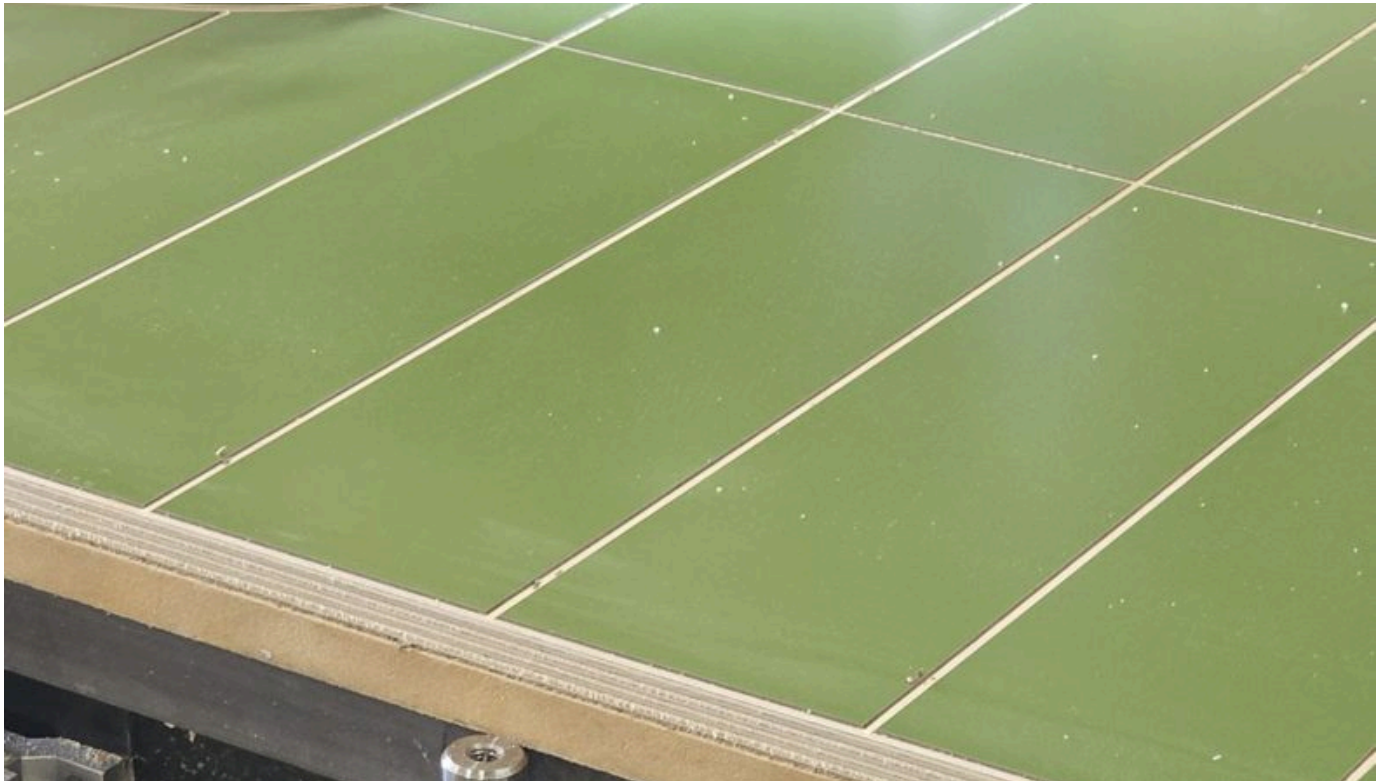


CNC GUIDE · REV. OCTOBER 2026

CNC ROUTING & CARVING. HOW TO SEND A JOB.

A working guide to getting parts cut, carved and finished at Calico: the materials we cut, the files to send, how to draw parts for a 3-axis router, what it can reach, the joinery we cut, and a checklist to run before you send.



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SEND THE PART. WE'LL TAKE IT FROM THERE.

Calico programs, cuts and finishes parts on a 3-axis CNC router in Los Angeles. Send CNC-ready files, a drawing or just a sketch. We nest it, program it, cut it and, if you need it, finish it.

01

SHEET CUTTING

Profiles, holes, pockets, dados and engraving in 4x8 ft sheets of wood, panel stock and plastics.

02

3D CARVING

Topography, bas-relief and sculpted forms, carved from the top in foam and wood. Deep forms are cut in layers and stacked.

03

CUT AND FINISHED

Sanded, sealed, primed, painted, gilded or aged, and assembled, so parts leave ready to use.

04

TECHNICAL DESIGN

No files? We model the part in Fusion 360 and send a 3D proof to sign off before anything is cut.

WHAT WE'LL ASK YOU

The shapes: files, a drawing or a sketch with key sizes

How many, or whether it's a one-off

Material and thickness, and whether sheets come prelaminated

Grain direction, where it shows

How tight the fits need to be

Finished or raw

For 3D work, the overall height of the part

When you need it, and pickup or delivery

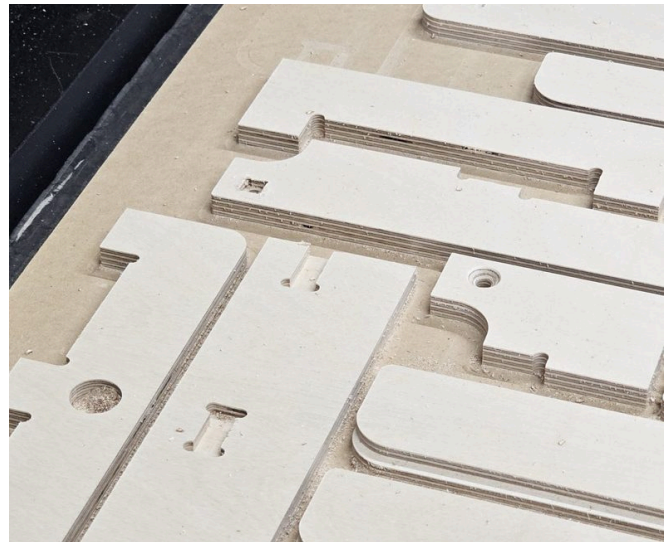
WHO IT'S FOR

Designers and architects with parts, panels and prototypes to make

Production designers and scenic shops working to a show date

Brands and studios with fixtures, models and display parts

Fabrication shops that need parts cut, carved or finished



Nested parts on the router bed.

HOW WE WORK

Quote back within 48 hours of complete information. Sometimes we'll call first.

Files checked first. We confirm sizes, fits and units with you before cutting.

3D proof to sign off on new models, shared as a Fusion 360 link.

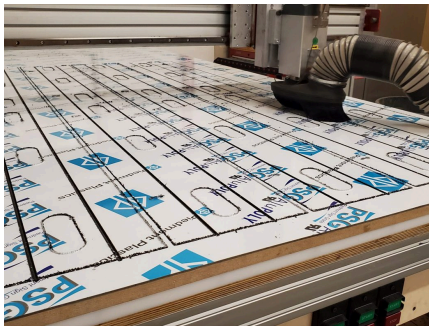
Part labels. We can engrave part numbers on each piece for assembly.

NDAs are routine. Ask before you send studio or client work.

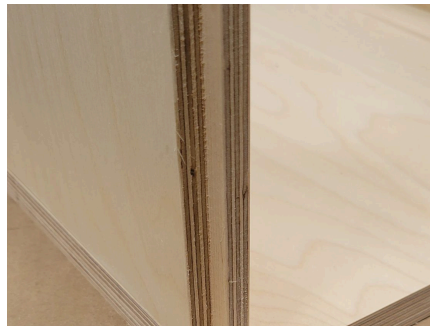
WHAT WE CUT.

Sheet goods, solid wood, foam, plastics and aluminum composite, in sheets up to 4×8 ft. If a material isn't listed, ask: we'll tell you whether it routes well and what it needs.

MATERIAL	GOOD FOR	NOTES
MDO Plywood with a resin-paper face	Painted cut shapes, letters and signs	Our default for painted cut shapes. Available primed.
Plywood Baltic birch, ACX and fire-retardant birch	Casework parts, tab-and-slot assemblies, scenic structure	3/4 in. plywood measures about 0.72 in. We size slots and dados to the actual sheet.
MDF and HDF Including colored MDF	Paint-grade parts, templates, relief and topography	Close to its stated thickness. Seal the edges before paint.
Laminate panels HPL pressed on a core, or prelaminated sheets	Fixtures, tops and grooved wall panels	Inside corners need a radius; laminate cracks from square corners.
Solid wood Maple, walnut, cherry, beech, oak, ash	Profiles, carved forms and small parts	On small parts, oak and ash chip; walnut, beech and cherry hold detail better.
Foam Urethane (HDU) and EPS	Carved scenic forms, sign blanks, topography	Urethane carves smooth and takes paint. EPS needs water-based coatings.
Plastics Acrylic, PVC foam board, HDPE	Panels, letters, covers and hard-wearing parts	Cut with the protective film on. HDPE is a solid plastic, tough and outdoor-safe.
Aluminum composite ACM: aluminum skins on a plastic core	Signs and flat panels	Cut and grooved on the router. We don't cut fiberglass or glass-reinforced panels.



Sheet routed with its protective film on.



Plywood seated in a routed dado.



Joinery cut into veneered panels.

OUR STOCK OR YOURS

We source sheet stock, or you can supply your own. We can't store customer material, so plan to drop it off close to the cut date.

WOOD MOVES

Warp and grain defects cost some yield on wood jobs. On solid wood and special stock, allow a spare board or sheet.

FILES WE WORK FROM.

CNC-ready files are fastest. A PDF, a model or a sketch with dimensions works too: we'll draw it and confirm it with you before cutting. We program in Fusion 360 and Rhino, and import most formats.

2D VECTOR

AI and SVG come in cleanest. DXF and DWG work; state the units, which DXFs often lose. Vector PDF too.

3D

STEP, IGES, Fusion 360, Rhino (3DM), SketchUp, STL and OBJ. For carving, relief and two-sided parts.

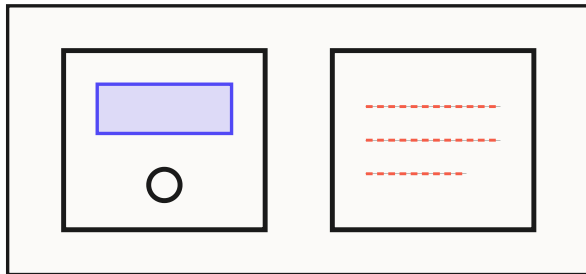
DRAWINGS

PDF shop drawings or elevations with dimensions. We build the model.

SKETCH

A photo of a sketch with key sizes is enough to start a quote.

SET UP LAYERS BY OPERATION



- CUT-THROUGH**
Outlines and holes, cut all the way through
- POCKET 6MM**
Pockets and dados, one layer per depth
- ENGRAVE**
Grooves, V-carve and marks on the face

FILE CHECKLIST

- ☐ Drawn at full size (1:1), with units stated
- ☐ Closed shapes for every part and hole
- ☐ No duplicate or overlapping lines
- ☐ All type converted to outlines, with no stroke widths
- ☐ Smooth curves (arcs or splines), not short straight segments
- ☐ One layer per operation and depth, named with the depth
- ☐ Features on the back face on their own layer
- ☐ Material, thickness and quantity in the file name or email

SEND PARTS, NOT SHEETS

Nesting your own layout is a nice thought, but we do it faster and more accurately on our end. We lay parts out to suit the material, the grain, the tooling and the machine. Send each part once, with its quantity.

GOOD TO KNOW

Lines are finished edges. We cut outside outlines and inside openings, so parts come out at the drawn size.

Fit-critical parts. Flag the slots, dados and joints that must fit, and how tight.

Smallest inside corner. Tell us the tightest radius a part can live with. It sets the bit (page 5).

OPTIONS TO ASK FOR

GRAIN ORIENTATION	Mark which way the grain runs on each part. We lock those parts to the grain when we nest, so faces and veneers line up.
PART LABELS	Part numbers, or the mark text from your drawings, engraved on each piece at 1/2 in. or taller, clear of joints and reliefs.
SCREW MARKS	Peck-drilled marks at screw locations, in place of small through holes.
SMALL-PART HOLDING	Tabs, a thin skin, or a vacuum fixture plate, depending on how clean the edges need to be.
PRELAMINATED SHEETS	Cut from sheets that already carry laminate or veneer.
EDGE QUALITY	Say how clean the edges need to be: straight off the bit, sanded, eased or chamfered. Show-quality edges take finishing passes and sharp tooling.
SURFACE QUALITY (3D)	For 3D milling, say what the surface needs to be: tool ridges left as texture, a fine finishing pass, or sanded smooth. A finer stepover is smoother but adds machine time.

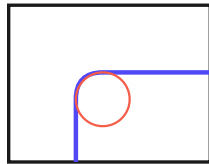
DRAWING PARTS THAT ROUTE CLEANLY.

A router cuts with a spinning bit, so a few rules shape every part. Draw with them in mind and parts fit the first time.

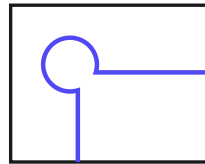
INSIDE CORNERS



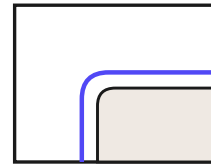
Drawn sharp
A square inside corner



As routed
The corner takes the bit radius



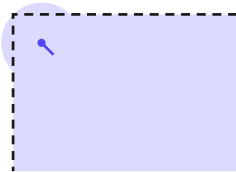
Dogbone relief
A square part seats fully



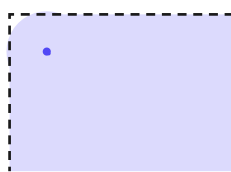
Rounded part
Or round the mating part to match

Any 90-degree inside corner comes out rounded to the radius of the bit. We cut sheet goods with 1/4, 3/8 and 1/2 in. end mills; a 1/4 in. bit leaves a 1/8 in. radius, and a 1/8 in. bit gets to 1/16 in. for fine detail, with more machine time. Deep pockets need a larger radius, about 1/4 in.

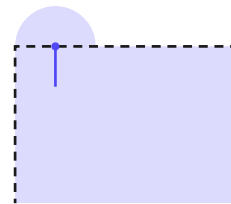
DOGBONE STYLES



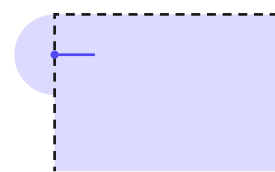
Corner
Clears the corner on the diagonal



Minimal
Less overcut, a slight edge break



Long side
Relief runs into the long face

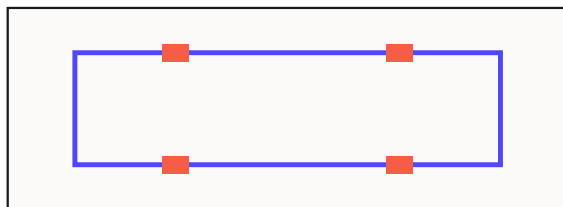


Short side
Relief runs into the short face

Dashed: the square part. Shaded: what the bit removes. Blue: the path of the bit's center.

Where a square part has to seat fully in a slot or pocket, the corners need a relief. We pick the style per joint, and for mortises we choose the long or short side so the reliefs land where they won't show. A relief drawn as a circle the exact size of the bit can't be traced: the bit can't move in and out of it cleanly, so it becomes a drill operation. Leave reliefs to us and we'll add them when we program the job.

SMALL PARTS AND THIN FEATURES



Tabs hold small parts in the sheet



Onion skin: a thin last layer
so parts stay put, then trimmed

Little parts are doable, but they need extra holding: small tabs, a thin skin we sand off after, or a fixture plate that holds them by vacuum. Keep bridges and narrow features in proportion to the material's thickness, or they break or chatter.

TOLERANCE

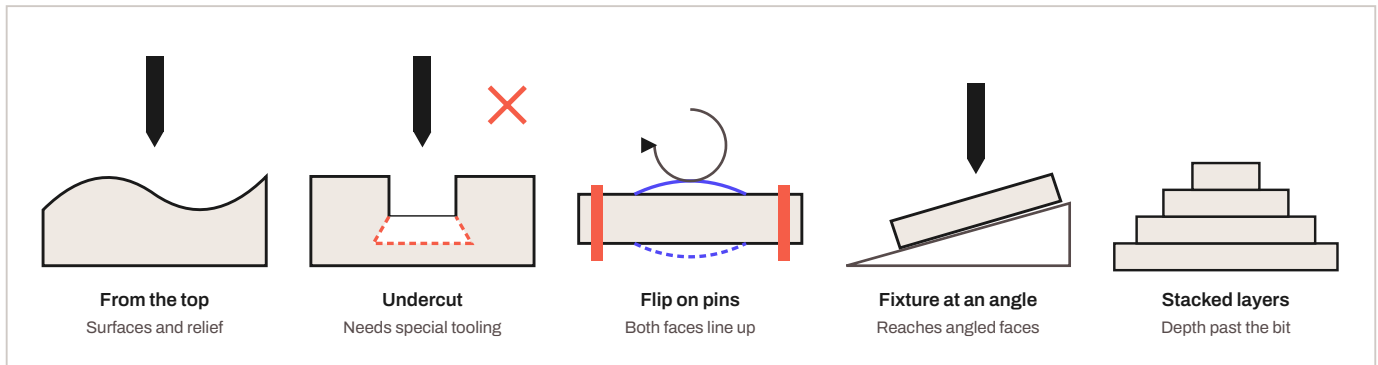
Cuts are sub-millimeter on the machine. Tell us how tight the fits need to be; the variable is usually the material. Plywood runs under its label and wood moves, so we size fit-critical cuts to the measured stock.

HOLES AND ENGRAVING

Holes are drilled or bored to size, and screw locations can be peck-drilled as marks. V-groove engraving puts lines, lettering and part labels on the face.

WHAT A 3-AXIS ROUTER CAN REACH.

The bit always comes straight down from above. That decides what one setup can cut, and how we work around it without a 5-axis machine.



POSSIBLE

One setup: profiles, holes, pockets, dados, rabbets and V-grooves on the top face.

3D from the top: topography, bas-relief and sculpted panels, roughed then finished with a ball-nose bit.

Two-sided parts: we flip the part and register it on pins, so both faces line up.

Multi-fixture setups: custom jigs hold a part at different angles, so we can reach faces one setup can't.

Undercuts with the right tooling: dovetail and keyhole cutters reach under the face from above.

Deep forms: carved in layers and stacked, then shaped and finished by hand.

Bigger than a sheet: split into sections that key together.

NOT SURE WHAT IT NEEDS?

Send the model. We'll tell you how many setups it takes and whether a flip, a fixture or a split part is the better route.

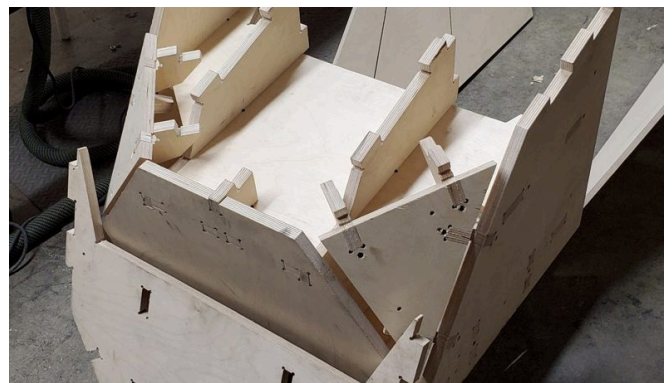
NOT POSSIBLE

Free-form undercuts with a standard bit. Anything hidden from above needs special tooling, a flip, a fixture or a separate part.

Sharp inside corners. They take the bit radius (page 5).

Parts over about 8 in. tall. That's the clearance we get with our end mill lengths. Taller forms are cut in layers and stacked.

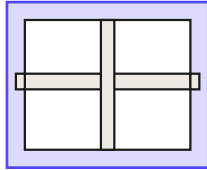
Raw thin veneer. It catches on the bit. Press it to a panel first.



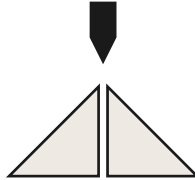
Tab-and-slot plywood parts, assembled into a faceted form.

JOINERY AND MULTI-SETUP WORK.

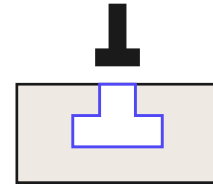
Past profiles and pockets, a lot of our work is joinery cut right on the machine and parts that take more than one setup. A few examples from recent jobs.



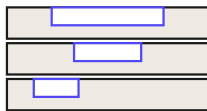
Hidden core
Tab-and-slot inside a veneered shell



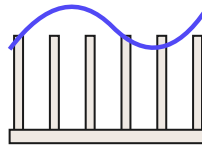
Miters on the machine
V and angled toolpaths



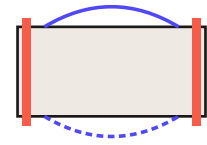
Keyholes and undercuts
A special cutter reaches under the face



Pocketed layers
Each layer cut, then laminated



Waffle form
Ribs assembled, then milled to shape



Two-sided parts
Glued up, milled, flipped on pins

CUT ON THE MACHINE

Hidden cores: a tab-and-slot skeleton in MDF or ply that locates every part, wrapped in veneered panels so no joinery shows.

Miters and bevels: cut with V and angled toolpaths, so panels come off ready to glue.

Keyholes and undercuts: keyhole hangers, dovetail slots and similar, cut from above with special cutters.

Dados, rabbets, laps and tab-and-slot: self-locating parts that assemble square.

Pocketed layers: each layer pocketed and counterbored at its own depths, then laminated into one thick part.



Waffle forms: ribs cut, assembled, then milled to shape.

MORE THAN ONE SETUP

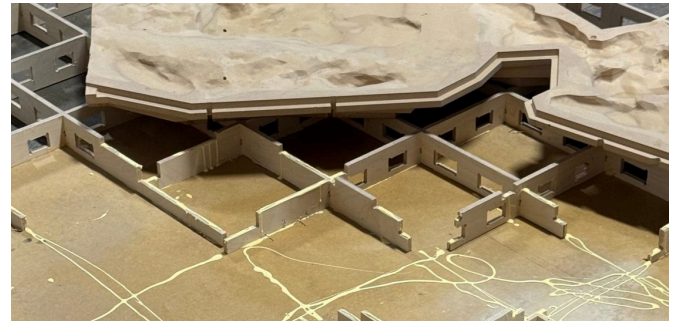
Waffle forms: ribs cut from Baltic birch, assembled into a frame, then milled to the final 3D shape.

Two-sided parts: blanks glued up first, then machined on both faces and registered on pins.

Carved halves: forms milled in halves and flipped to reach slanted faces, then joined.

Angled fixtures: a simple jig tilts the part to reach a face the bit can't from above.

Prototype first: on new joinery we cut a full-size MDF test to dial in fits before the good material.



A slotted rib grid under a milled terrain surface.

CARVED, THEN FINISHED.

Routing is often the first step. Our scenic artists finish the same parts, so they leave the building ready to use: one schedule and one point of contact.

3D CARVING

Topography, bas-relief and sculpted forms in foam, MDF and wood, carved from your 3D model or one we build. Deep forms are cut in layers and stacked, then shaped and finished by hand.



Stacked contour layers for a topography model.

FINISHING OPTIONS

RAW	Cut and cleaned up, ready for your shop.
SANDED AND SEALED	Sanding sealer and polyurethane, tinted clear or wax, with eased or chamfered edges.
FIRE-RETARDANT	Fire-retardant clear coat for show and venue parts.
PRIMED	Primed and ready for your paint. Primed MDO is our default for painted shapes.
PAINTED, GILDED OR AGED	Paint, metal leaf, faux and patina by our scenic artists.
ASSEMBLED	Glued, fastened and fitted into finished pieces.

WAYS TO WORK WITH US

CUT TO FILE	Your CNC-ready files, checked, nested and cut.
FILES FROM A SKETCH	We model and program from your sketch, PDF or reference.
CUT AND FINISHED	Routed parts sealed, primed, painted, gilded or aged.
3D CARVING	Topography, relief and sculpted forms.

THE TEAM BEHIND IT

The people who finished for Imagineering, Marvel, Mandalorian and Dune, now on permanent work in Los Angeles.

FROM FILE TO FINISHED PART.

01

SEND IT

Files, a drawing or a sketch, with material, quantity and date.

02

QUOTE

A line-item quote within 48 hours of complete information.

03

SIGN OFF

Files or a 3D proof approved, payment in, and the job is on the schedule.

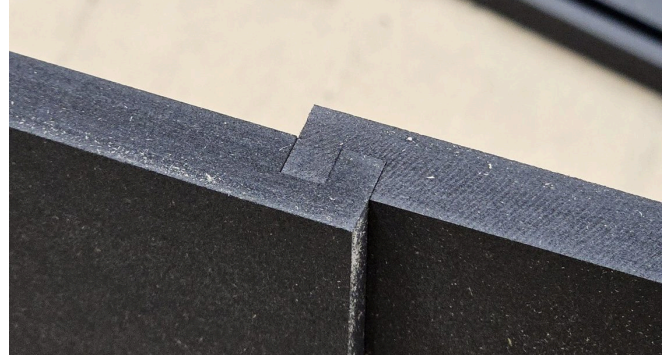
04

CUT AND READY

Cut, checked and finished if ordered, then picked up or delivered.

TERMS

SMALLER JOBS	Paid in full to go on the schedule.
LARGER PROJECTS	50% deposit on approval, balance before pickup or delivery.
PURCHASE ORDERS	Institutions and companies on a PO: terms by arrangement.
RUSH	Available. The rush rate depends on how soon after approval you need it.
DESIGN TIME	Modeling and programming from sketches is a line item.



Rabbeted edges, cut on the router.

BEFORE YOU SEND: CHECKLIST

Run through this with your files. The more boxes you can tick, the faster the quote.

THE PART

- ☐ Files, a drawing, or a sketch with key sizes
- ☐ Quantity, or a one-off
- ☐ Material and thickness, or what the part has to do
- ☐ Our stock or yours; prelaminated or not
- ☐ Grain direction, where it shows
- ☐ Fit-critical joints flagged, with the tolerance
- ☐ Edge quality required

THE FILES

- ☐ Drawn 1:1, with units stated
- ☐ Closed shapes, no duplicate lines
- ☐ Type outlined, no stroke widths
- ☐ Layers by operation and depth
- ☐ Back-face features on their own layer
- ☐ Parts sent one by one, not nested

THE JOB

- ☐ For 3D: overall height, up to about 8 in.
- ☐ For 3D: surface quality required
- ☐ Finish: raw, sealed, primed, painted, gilded or aged
- ☐ Assembled, or loose parts
- ☐ Part labels engraved, or none
- ☐ Date you need it
- ☐ Pickup or delivery
- ☐ NDA, if the work is under one

SEND TO

howdy@heycalico.com · heycalico.com/cnc-routing