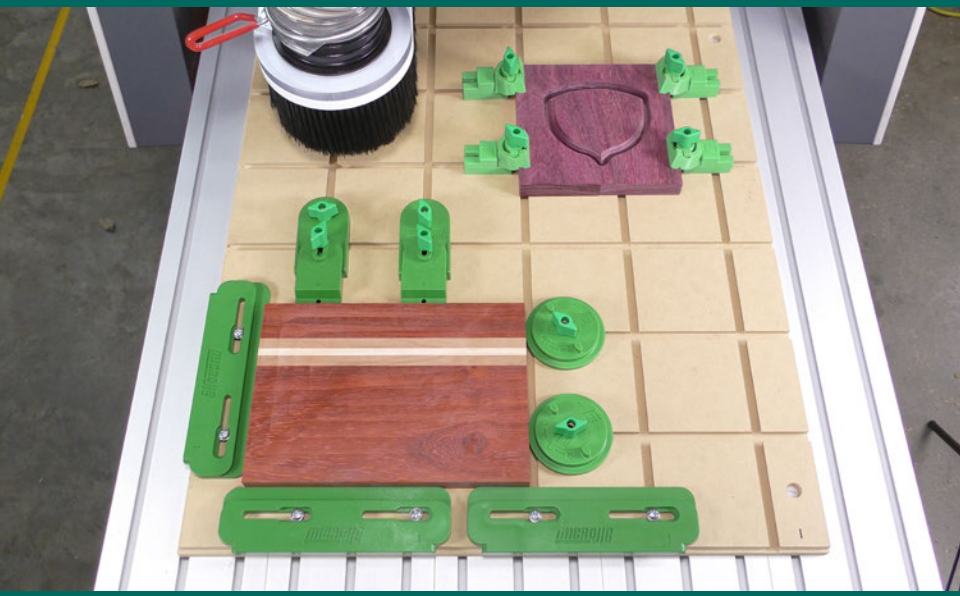
MICROJIG®

MATCHFIT®



CNC Work-holding Kit

Instruction Manual

Table of Contents

Section	Page #
A. CNC Kit Instructions	4
1. Edge Guide Setup	7
2. Edge Guide in Use	10
3. Ring Clamp Setup	12
4. Ring Clamp in Use	16
5. Ramp Clamp Setup	18
6. Ramp Clamp in Use	21
7. U-Pad Clamp Setup	24
8. U-Pad Clamp in Use	26
9. Combining Clamps	31
B. Spoilboard Instructions	32
10. How to build the Spoilboard	33
11. CNC Machines with T-track Bed	36
12. CNC Machine without T-track Bed	39
13. All CNC Machines	40

Parts List

Parts	Description	Qty
CN-P1	Edge Guide	3
CN-P2A	Ring Clamp Hub	2
CN-P2B	Ring Clamp Ring	2
CN-P3A	Ramp Clamp Base	2
CN-P3B	Ramp Clamp Pusher	2
CN-P4A	U-Pad Pad	4
CN-P4B	U-Pad Adapter	4
CN-P4C	U-Pad Riser Block	4

CNC Kit Hardware	Description	Qty
GR-H52-EH	Wing Knob	10
DV-HL1.0-EH	1“ Track Screw	6
DV-HL2.0-EH	2” Track Screw	4
DV-HL0.0-EH	Track Nut	6
10-32 x 1/2"	Machine Screw	6
#10	Washer	6

Spoilboard Hardware	Description	Qty
CN-H10	1/4-20 Nylon Screw	6
GR-H7	1/4-20 Oval Nut	6

A MatchFit® CNC Kit Instructions

Successful milling with a benchtop CNC machine requires secure holding of the parts and no single solution works for all tasks. Cutting parts from a larger blank can usually be best accomplished with overhead clamps holding stock down on the machine bed. When work needs to be done across the part surface, it must be held just by the edges to prevent damage to the clamps and bits.

Microjig's CNC Clamping kit uses our MATCHFIT Dovetail hardware to provide you with secure work holding under both conditions, with no tools needed for most setups.

- Edge Guides locate along your spoil board to provide an accurate, low profile Origin Point for easy setups, especially when repeating programs.
- Ring Clamps™ can be placed anywhere along your work table to lock and unlock your parts with just a twist of the wrist.
- Ramp Clamps™ use ramps to hold parts applying force in and down to prevent movement and lifting.
- U-Pad™ top clamps hold parts from the top edge preventing both lifting and sliding for superior hold on parts up to 1-1/8" (28mm) thick.

For tasks like carving or surfacing a glue up, The Ring Clamps™ and Ramp Clamps™ can be used together or with the Edge Guides to hold the stock leaving the top face clear for working.

Fig 0a - Edge Guide with Clamps

When cutting parts out of sheet goods or larger boards, U-Pad™ clamps grip the workpiece from the top and the side preventing movement even under heavy cutting loads.

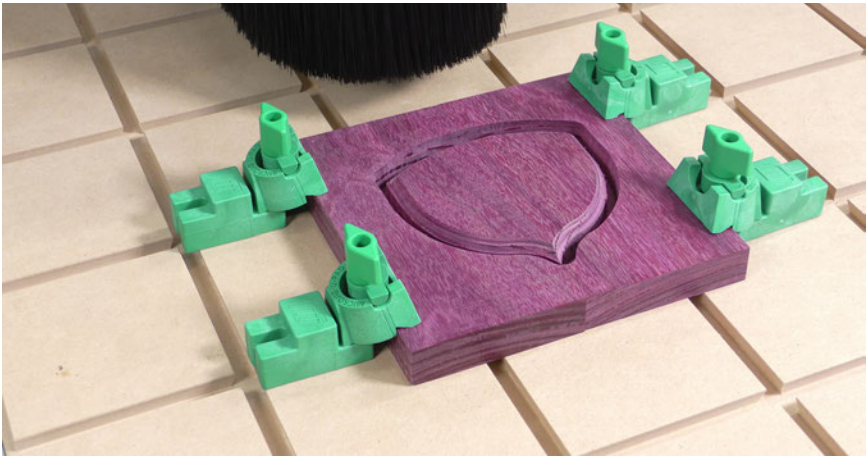


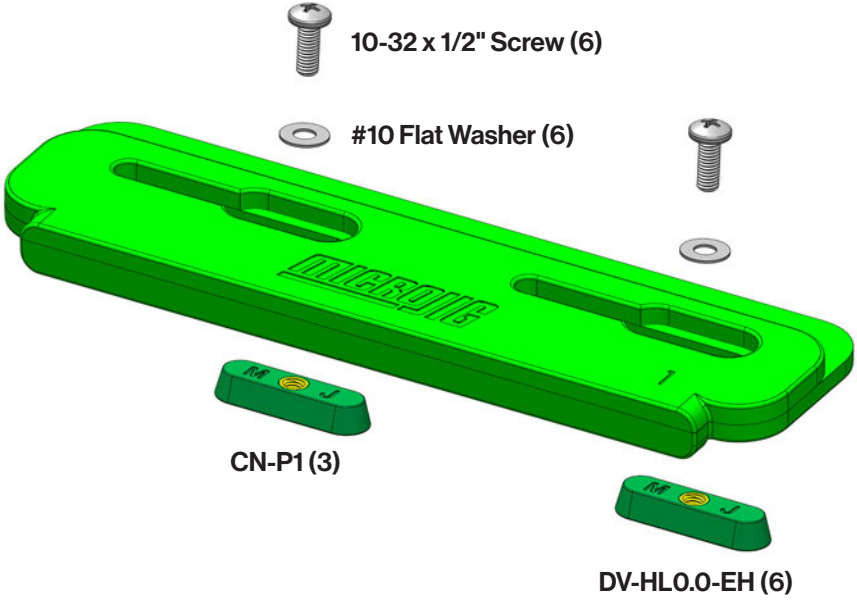
Fig 0b - U-Pad Cut

This system works seamlessly with a “spoilboard” you make that protects your machine bed and provides the MATCHFIT Dovetail Grooves for the clamping tools.

Full instructions for making your own spoilboard are included in this kit, or can be downloaded from:
https://microjig.com/user-manuals

Each of the parts in this kit are packed with the hardware required for easy set up.

1 Edge Guide Setup



1.1. Three Edge Guides marked “1” are provided along with six Track Nuts, washers and screws to lock them in place.

1.2. Set one Track Nut into each of two adjacent grooves where you want to position the Edge Guides. (Fig 1a)

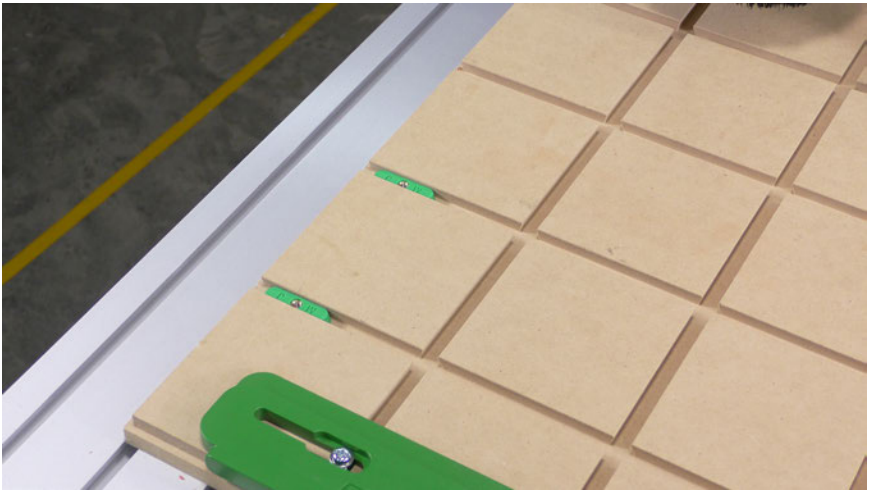


Fig 1a - Edge Setup 1

1.3. Set the Edge Guide onto the spoil board so that the threaded inserts of the Track Nuts are visible through the counterbore slots. The MicroJig Logo shows the top side of the Guide.

1.4. Thread the provided machine screws through a washer, the body of Edge Guide and into the Track Nuts.

1.5. The Edge Guide can be adjusted up to 1" (25mm) side to side for final positioning.

1.6. Secure the Edge Guides in place by tightening the screws. The drop edge of the Guide should be tight against the edge of the spoilboard when locked in place. (Fig 1b)

Fig 1b - Edge Setup 3

1.7. The Edge Guides reference off your spoilboard to provide a known origin point within your work surface. Just jog the head from the front left corner of your spoilboard 2.00" (50.8mm) in both X and Y, then zero the Axes and save that as a home position to use whenever you are using the edge guides.

1.8. The clamping face of the Edge Guides is molded in a low profile to allow bit clearance around the edges of your parts and is angled to help keep the stock tight to the machine bed as you tighten the clamps.

2 Edge Guide in Use

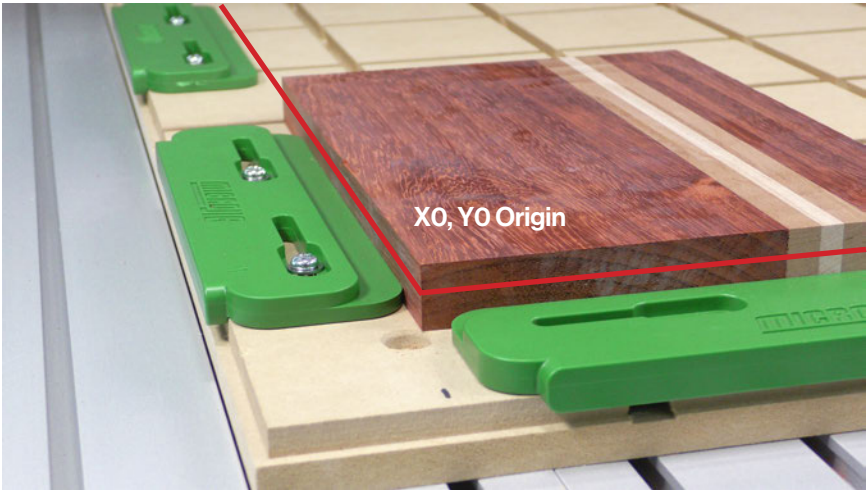


Fig 2a - Edge Guide Origin

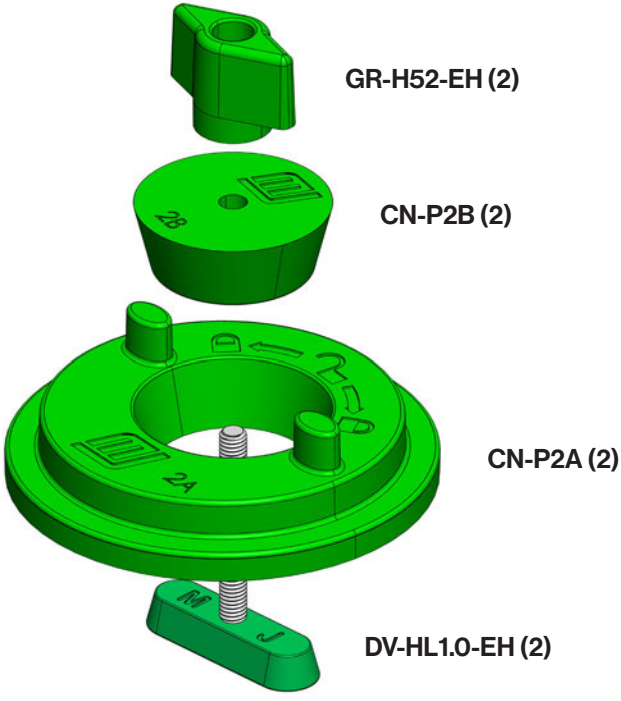
2.1. One Edge Guide along adjacent edges of the spoilboard provide a reference point in the corner where they cross. The third Guide can be added to either edge to provide additional location support for longer parts.

2.2. Place the workpiece into the corner formed by the Edge Guides and secure it against them using Ring Clamps and/or Ramp Clamps as described in their instructions.

2.3. On a MatchFit Dovetail workbench, it can be used as a low profile stop for holding work when sanding or planning. The ABS plastic body covers the metal screws and won't damage chisel or plane blades in use.

Fig 2b - Edge Hand Plane

3 Ring Clamp Setup



3.1. Ring Clamps are eccentric cam clamps that feature a center hub. They tighten and loosen very quickly with just a twist of the wrist.

3.2. The center hub (P2B) locks to the table allowing the ring (P2A) to turn so the locking knob does not loosen in use.

3.3. Two Ring Clamps are included. Each package is made up of two rings marked “2A”, two hubs marked “2B”, two 1” Track Screws and two wing knobs.

3.4. Ring Clamps hold from the part edges leaving the top free for milling. They can be used to press towards each other or against the Edge Guides and Ramp Clamps we make as part of the MatchFit workholding system. (Fig 3a)

Fig 3a - Ring use

3.5. Slide one of the 1” Track Screws into a dovetail groove where you want to set the clamp. (Fig 3b)

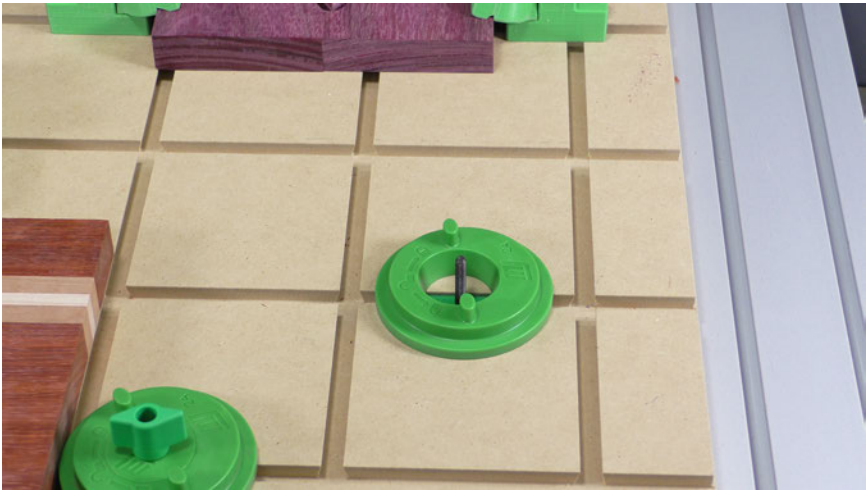


Fig 3b - Ring setup 1

3.6. Place the ring section over the Track Screw and slide the hub down the threaded section of the Track Screw. The “2A” and “2B” markings on the ring and hub should be up. The hub is tapered to fit inside the tapered hole in the ring.

3.7. Screw the wing knob onto the threads of the Track Screw and the Ring Clamp is ready for use. (Fig 3c)

3.8. The thin clamping edge of the ring extends beyond the clamp body to provide clearance for milling the upper edges of the workpiece without hitting the Ring Clamp.

3.9. This clamping edge is angled toward the base to hold parts tight to the work surface under pressure when clamping.

Fig 3c - Ring setup 2

4 Ring Clamp in Use

4.1. Position the Ring Clamp so that the “Unlocked” icon is facing the part and the clamping edge is approximately 1/16" (2mm) from the edge of the stock. (Fig 4a)

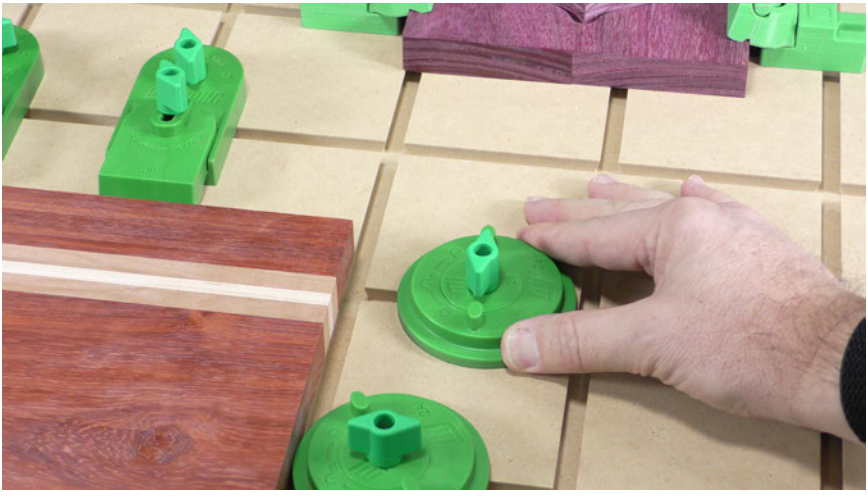


Fig 4a - Ring lock 1

4.2. Secure the hub in place by tightening the wing knob. The hub will hold the ring in place while allowing it to turn.

4.3. Tighten the clamp using the two “ears” to rotate the ring either left or right. The “Unlock” icon is the narrow part of the ring. Turning in either direction toward the “Locked” icons presses the clamping edge of the ring into the part being held. (Fig 4b)

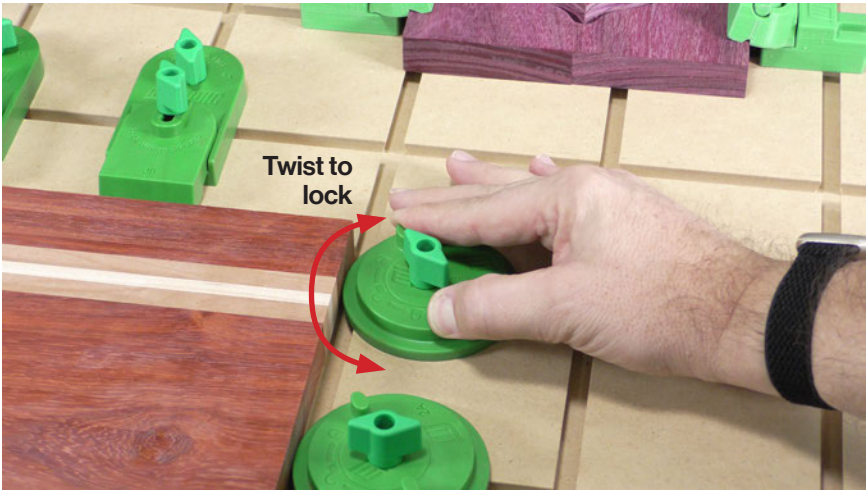
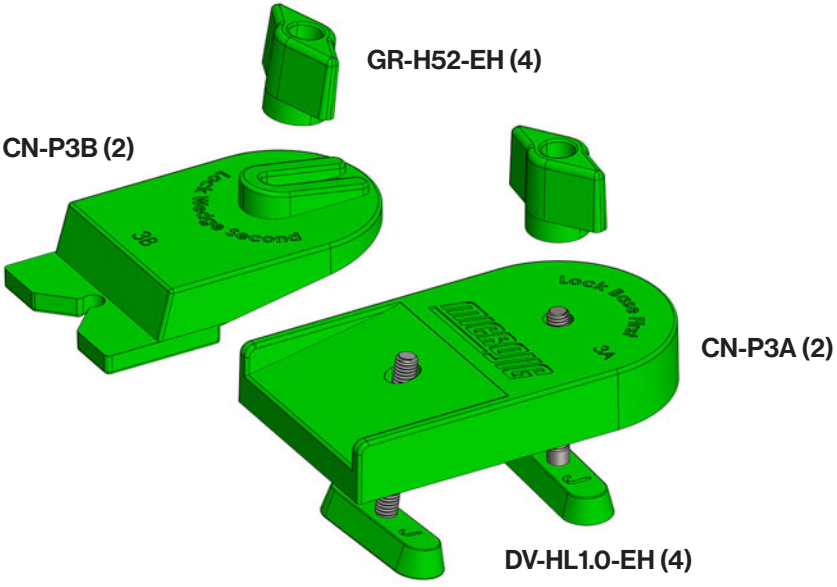


Fig 4b - Ring lock 2

4.4. Always turn the ring to rotate towards an opposing stop, clamp, or Edge Guide to ensure that the workpiece is pressed toward a stop.

4.5. When changing work pieces, just twist the ring so set the “Unlock” icon next to the stock. The next piece can be secured with a twist toward a “Locked” icon.

5 Ramp Clamp Setup



5.1. Ramp Clamps feature a clamping edge that moves forward and down along a ramp to provide clamping force in two directions.

5.2. Microjig's Ramp Clamps use our Dovetail Hardware to make all setup and adjustments fast and easy with no tools needed. (Fig 5a)

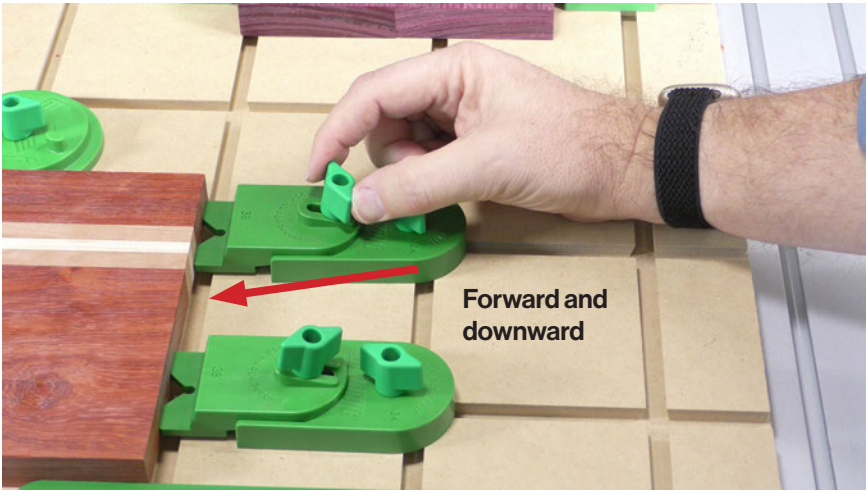


Fig 5a - Ramp Clamp Use

5.3. Two Ramp Clamps are included. Each package contains two bases marked "3A", two pushers marked "3B", four 1" Track Screws and four wing knobs. The sides marked "3A" and "3B" should be facing up in use.

5.4. Slide one of the 1" Track Screws into the dovetail groove where you want to set the clamp.

5.5. Slide one 1” Track Screw from the bottom of 3A up through the slot in the ramp section, then slide the base onto the Track Screw in the dovetail groove.

5.6. The pusher 3B is set onto the base 3A so that the Track Screw in the ramp passes through the slot in the pusher 3B. (Fig 5b)

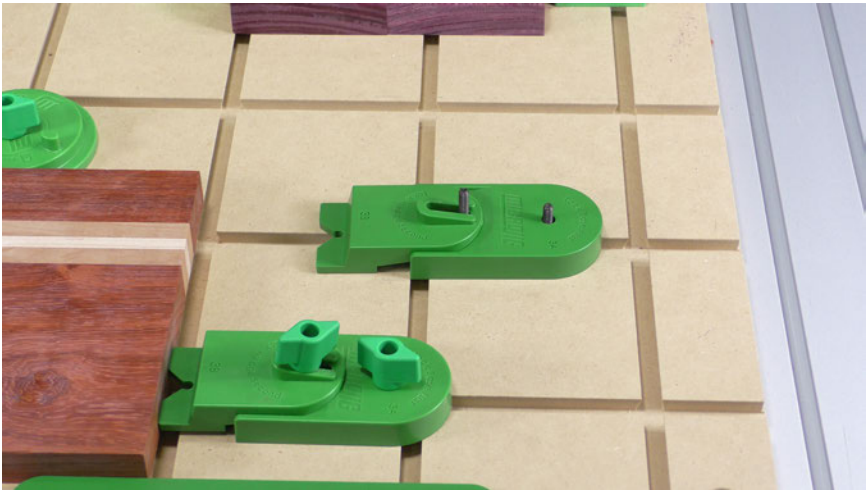


Fig 5b - Ramp Clamp set

5.7. Thread a wing nut onto both Track Screws and the Ramp Clamp is ready to be used where needed.

5.8. Tightening the wing knob on the pusher 3B forces it down the ramp on 3A where it applies pressure to the workpiece.

5.9. Loosening the wing knob on 3B opens the clamp releasing pressure on the work piece.

5.10. Ramp Clamps hold from the part edges leaving the top free for milling. They can be used to press towards each other, opposing the Edge Guides or Ring Clamps we make as part of our MatchFit workholding system.

5.11. The clamping edge on the pusher 3B is low profile to allow bit clearance around the part edges during operation and is angled to hold parts down as pressure is applied.

5.12. The clamping edge is also notched to allow for clamping stock at a corner or along curved edges for maximum flexibility.

6 Ramp Clamp in Use

6.1. Loosen pusher 3B and slide it up the ramp to retract it.

6.2. Position the Ramp Clamp so the pusher is about 1/16" (2mm) away from the part to be clamped.

6.3. The Ramp Clamp can be pivoted around the base Track Screw to push in any direction needed.

6.4. Lock the Ramp Clamp in place on the bed by tightening the wing knob on base 3A. (Fig 6a)

6.5. Tighten the wing knob over pusher 3B to apply clamping pressure. 3B moves down and forward on the ramp to apply pressure forward and downward.

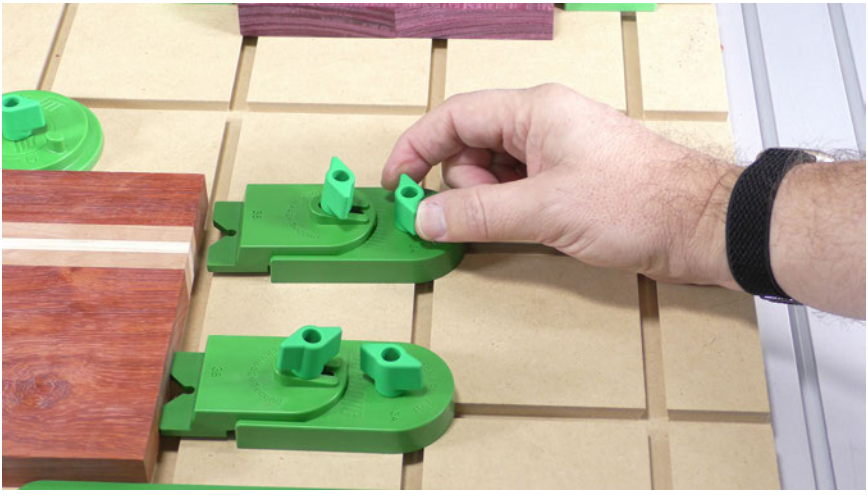


Fig 6a - Ramp Clamp Use

6.6. The pusher 3B can be adjusted over a range of about 1/2" (13mm) to secure parts even when they compress a bit.

6.7. For holding very thin materials, set the Ramp Clamp about 3/8" (9mm) away from the stock before tightening the ramp wing knob. This sets the pusher 3B further down the ramp so it presses on the part closer to the bottom edge.

6.8. Set the Ramp Clamp at an angle to apply pressure in two directions at the corner of a part. (Fig 6b)

6.9. Curved parts are held by setting notched clamping edge along the arc and adjusting the Ramp Clamp to the best angle for the part being held. (Fig 6c)

Fig 6b - Ramp Clamp Use

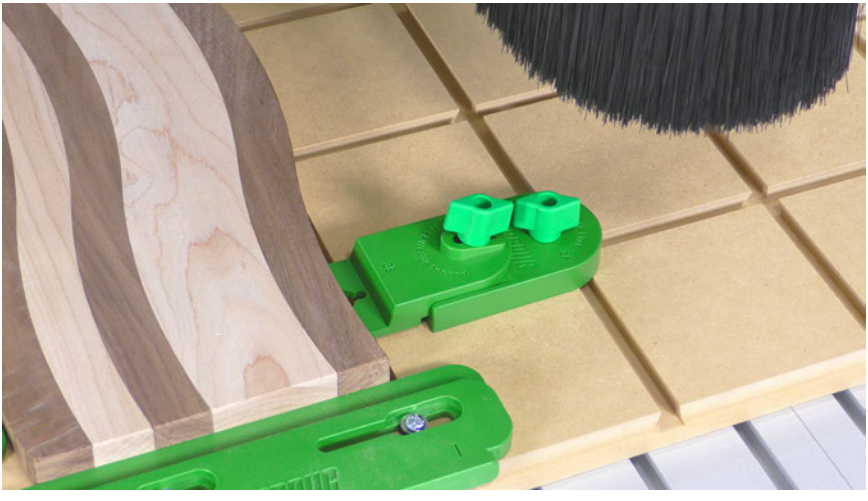
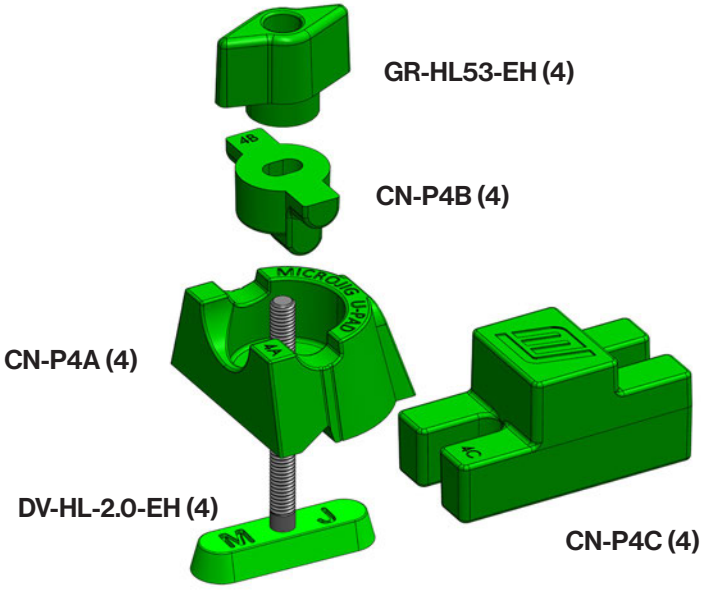


Fig 6c - Ramp Clamp Use

7 U-Pad Clamp Setup



7.1. U-Pad clamps are designed to provide superior hold when clamping parts along the top edges.

7.2. The U-Pad holds parts along the top corner edge holding the stock top and side at the same time.

7.3. The notch in the clamping face holds parts downward, but also prevents the part sliding side to side during heavy cutting. (Fig 7a)

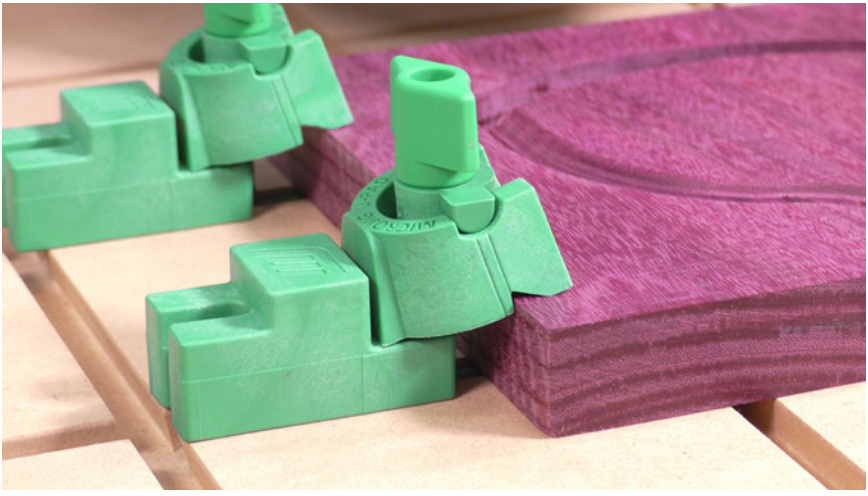


Fig 7a - U-Pad closeup

7.4. Four U-Pads are included. Each U-Pad is made up from the pad “4A”, a screw adapter “4B”, the stepped riser block “4C”, a 2" Track Screw and a wing nut.

7.5. Slide 2" Track Screws into the dovetail grooves as needed.

7.6. Guide the slot in Pad “4A” over the threads of the Track Screw. The part numbers 4A, 4B, and 4C should face up in use.

7.7. Guide the screw adapter “4B” over the Track Screw and seat the pivots in the notches of pad 4A. The 4B mark can be to the left or right.

7.8. The stepped riser block 4C allows the U-Pad to clamp stock from 1/16" (1.5mm) to 1-1/8" (28.5mm) thick.

8 U-Pad Clamp in Use

8.1. 1. Position the assembled U-Pad clamp in the dovetail groove near the side of your workpiece.

8.2. Adjust the position to capture the corner edge of the stock in the notch of pad 4A. (Fig 8a)

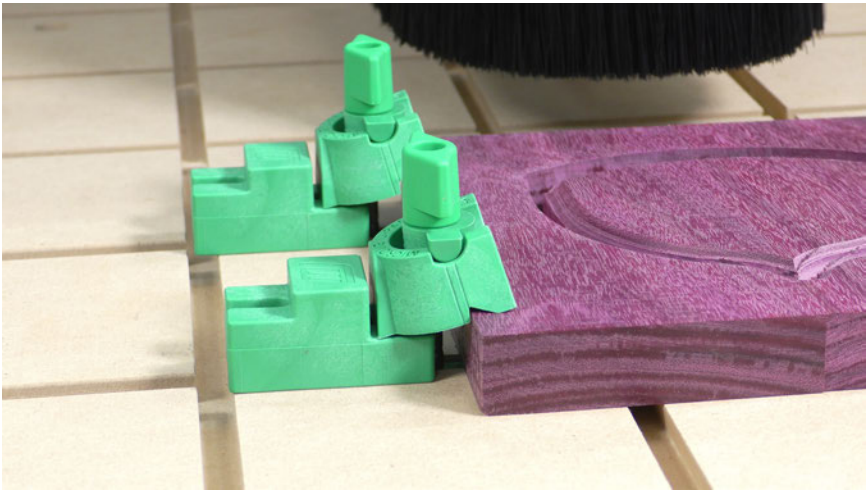


Fig 8a - U-Pad Angle

8.3. The pad 4A is designed to work at an angle of about 15 to 30 degrees to properly lock the top edge of the part.

8.4. For stock from 1/16" (1.5mm) up to 1/2" (13mm) thick, the riser block 4C is not used. Secure the part by tightening the wing knob. (Fig 8b)

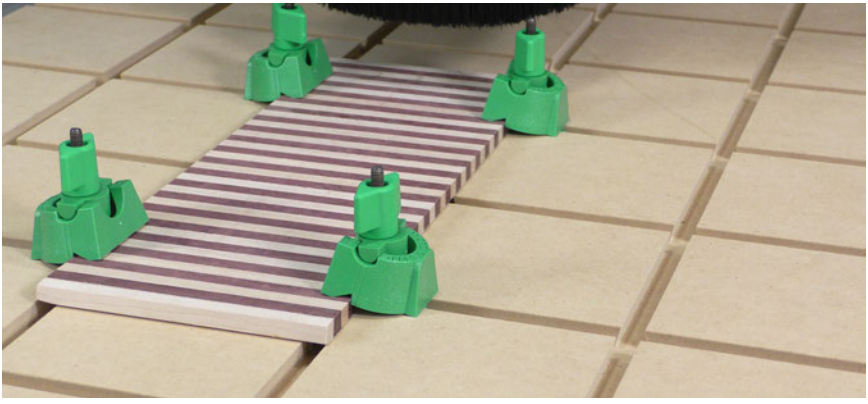


Fig 8b - U-Pad low

8.5. Parts over 1/2" (13mm) but less than 7/8" (22mm), require use of the riser block 4C. Set the short side that is marked 4C under the lower heel of pad 4A and apply pressure by turning the wing knob. (Fig 8c)

Fig 8c - U-Pad medium

8.6. Parts thicker than 7/8” (22mm) require the taller end of the riser block 4C to be set under the pad 4A. Tighten the wing nut to apply the needed pressure. (Fig 8d)

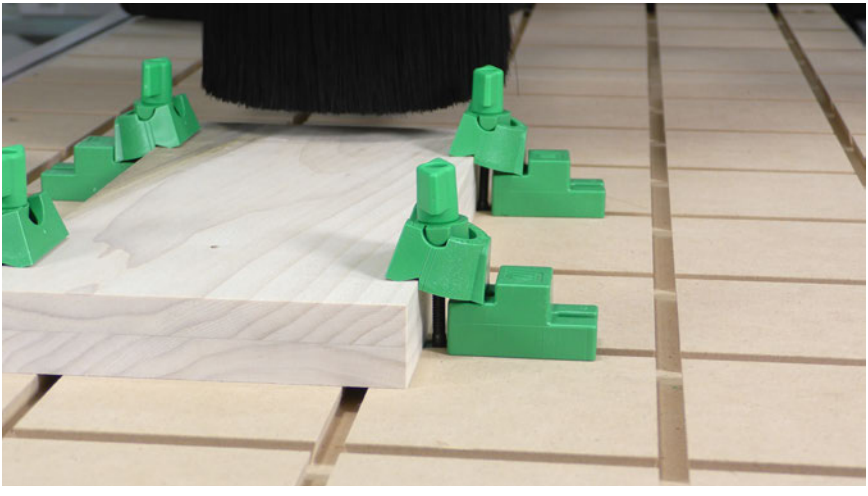


Fig 8d - U-Pad high

8.7. U-Pads can be placed anywhere on your MatchFit Spoilboard to hold parts of any shape.

8.8. For holding taller stock, The U-Pad can be used with MatchFit Track Nuts and a section of 10-32 threaded rod (available separately). The center section of the riser block 4C supports the U-Pad for parts up to 1-1/2” (38mm). The split legs of the riser block 4C pass the threaded rod to support the dovetail groove. (Fig 8e)

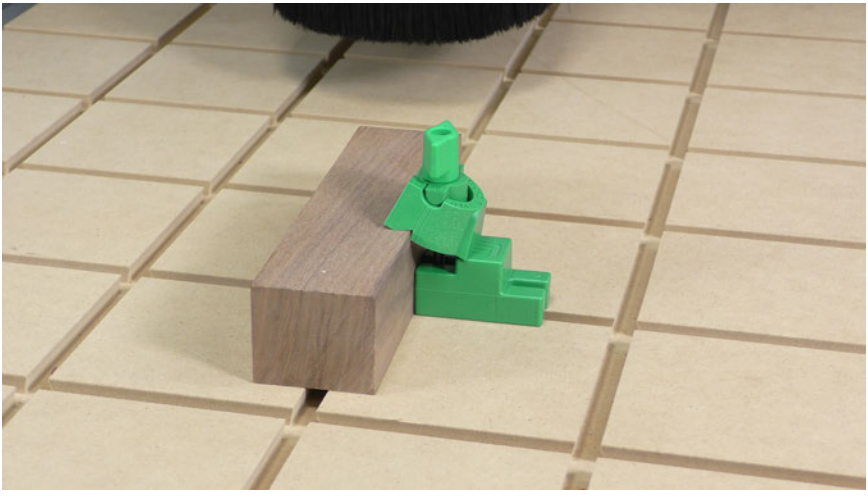


Fig 8e - U-Pad Optional Setup

8.9. The U-Pad Clamp is especially useful on MatchFit Dovetail clamping tables, benches, and jigs.

9 Combining Clamps

9.1. The MatchFit CNC Workholding System parts can be used separately but are most versatile when combined to give the most holding options. (Fig 9a)

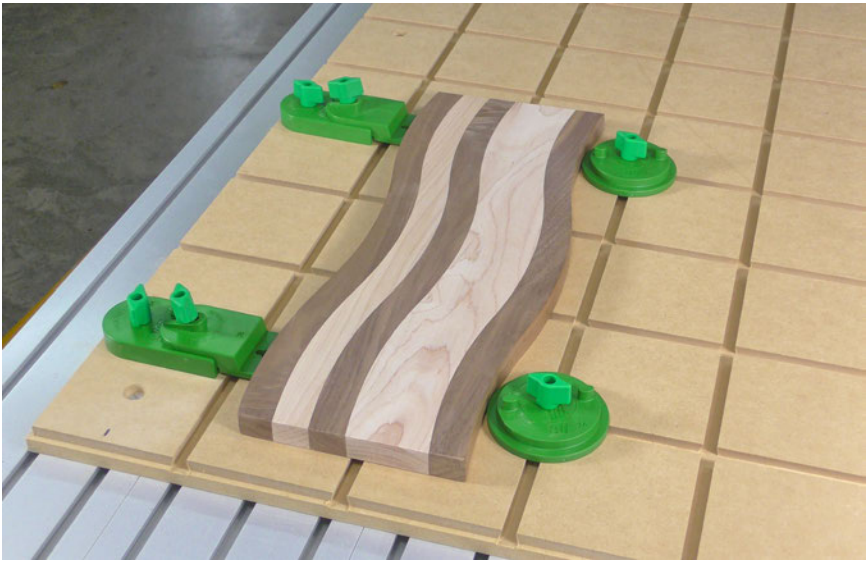


Fig 9a - Edge Clamps

9.2. The Edge Guides make excellent fixed stops to press against with Ring Clamps and Ramp Clamps.

9.3. Locating the stock at the Edge Guide origin point and using the U-Pads to hold stock is very efficient when running the same job over and over.

9.4. The Edge Guide reference points are accurate enough for two-sided machining when the program is written for it. (Fig 9b)

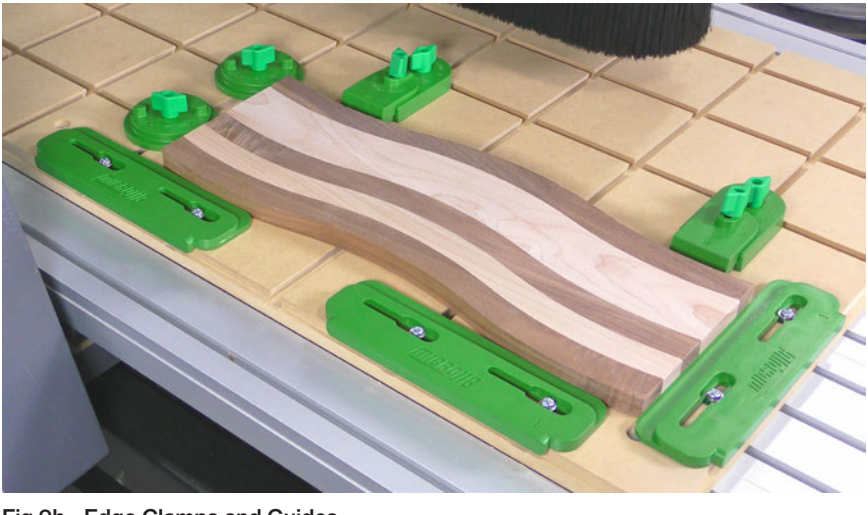
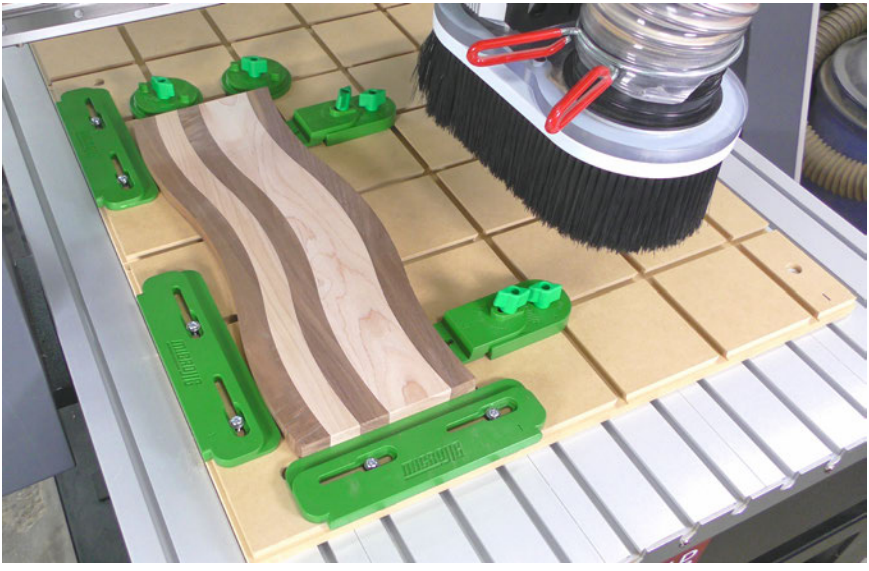


Fig 9b - Edge Clamps and Guides

9.5. The system covers the majority of your workholding needs helping you get the most from your CNC.

B MatchFit® Spoilboard Instructions



A Spoilboard is a panel used between the part being milled and the bed of your CNC to protect it from being damaged when cutting parts out of the stock. A good spoilboard also helps with clamping the parts securely during milling.

Our MatchFit Spoilboard design is easy to program and make, and when used with our CNC Workholding Kit, or your own shop built hold-downs, it offers maximum versatility to your milling operations.

Six nylon screws and oval nuts are included to secure your spoilboard to the machine bed. Nylon screws will not damage your bits if you happen to accidentally cut into one by mistake.

10 How to build the Matchfit Spoilboard

10.1. Start by determining the “working envelope” of your CNC, which is different than the size of the machine. The working envelope is the area that your router bits can reach to cut above the machine bed.

10.2. Jog the bit as far into the front left corner of your machine as it can go without hitting any stops or limit switches. Reset the X and Y axes to Zero. This is the same point your CNC zeros to if it has a homing function on startup.

10.3. Carefully jog the bit as far into the back right corner as possible without hitting any stops or limit switches. The X, Y coordinate showing on your PC or Pendant at this point is the working envelope of your CNC machine. For example, the Microjig Shop machine envelope is about X594.12, Y1194.12 or about 23" x 47". (Fig 10a)

Fig 10a - Spoilboard Envelope

10.4. Your spoilboard size should be 1" (25mm) smaller around than the working envelope to allow for milling the entire top flat when needed. So 22" (585mm) by 46" (433mm) for the example above.

10.5. Jog your head to X0.5" (12mm), Y0.5" (12mm) and reset the origin to X0, Y0. This will be the origin for your spoilboard program.

10.6. Cut a piece of 3/4" (19mm) MDF to your spoilboard size and set it onto your machine bed so the front left corner is centered under the spindle and the board is as square to the machine bed as possible. (Fig 10b)

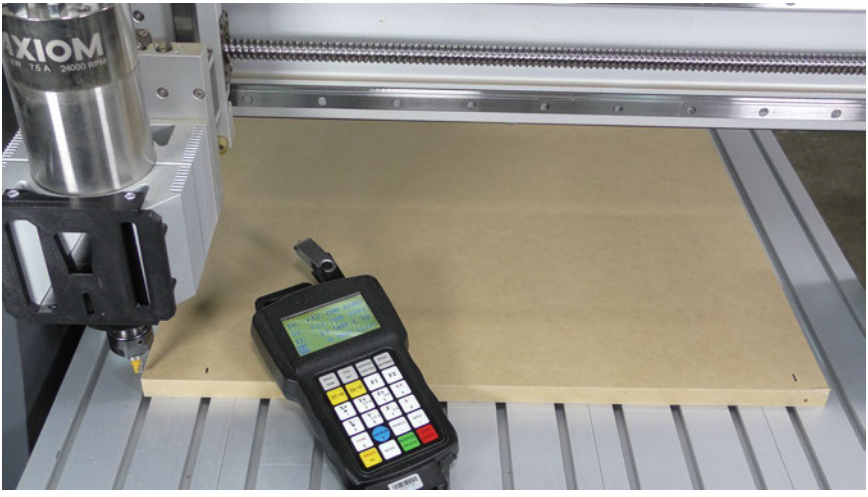


Fig 10b - Spoilboard Set

11 CNC Machines with T-track Bed

11.1. Mark locations in the four corners to drill mounting holes. These holes should align with the T-Track grooves. Mark two more holes along the long edges of the spoilboard if needed. Mark for grooves every 4” along the edge and set the mounting holes in between grooves. (Fig 11a)

Fig 11a - Spoilboard T-track bed

11.2. Remove the MDF from the machine bed and drill a 1/2" (13mm) counter bore 5/16" (8mm) deep at each mounting location.

11.3. Drill a 1/4" (7mm) through hole in the center of each counter bore. The ZeroPlay 2-Step Bit can be used to make both holes (11.2 and 11.3) in one. (Fig 11b)

Fig 11b - Spoilboard Drill

11.4. For machines with T-track beds, place one of the included 1/4-20 Nylon screws in each mounting hole and thread the steel oval nut onto the end of the screw. (Fig 11c)

11.5. Slide the spoilboard onto your machine bed aligning the oval nuts to fit into the T-track and reset the front left corner of the spoilboard to the X0.5", Y0.5" (X12mm, Y12mm) position. (Fig 11d)

11.6. Tighten the nylon screws to secure your spoilboard to the bed. **Go to Step 12.3.**

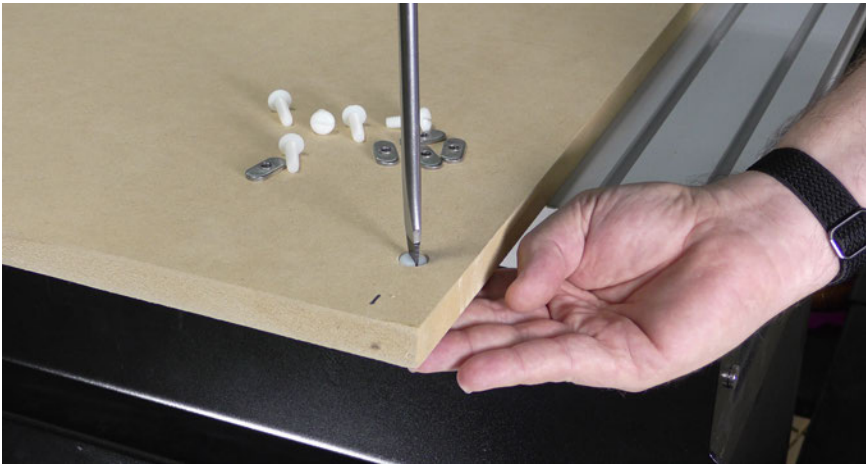


Fig 11c - Nylon Screw

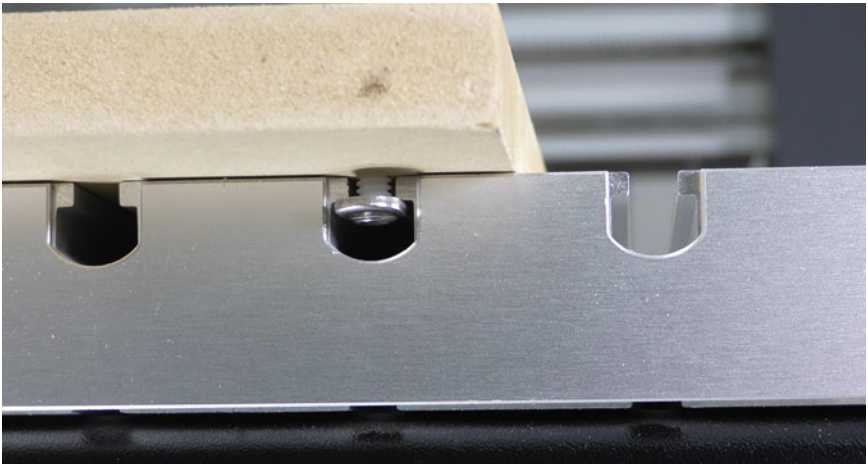


Fig 11d - Nylon Screw close-up

12 CNC Machines without T-track Bed

12.1. Drill a 1/2" Counterbore or countersink hole 1/2" deep in the corner of the MDF. (Fig 12a)

Fig 12a - Nylon Screw close-up

12.2. Drill a through hole centered on these holes to screw the spoilboard to your work surface as needed for your machine setup. You can use threaded inserts or T-nuts with the nylon screws included in the kit.

12.3. For further ideas, check with your machine manufacturer for alternative methods of creating the work surface to mount your spoilboard on.

13 All CNC Machines

13.1. In your CAD/CAM software draw a rectangle the size of your spoilboard and create a set of horizontal and vertical lines 4" (100mm) apart across the rectangle and extending 3/8" (9mm) beyond the border as shown. The last line in each direction should not be less than 2" (50mm) from the edge and should not interfere with the mounting holes drilled in Step 12. (Fig 13a)

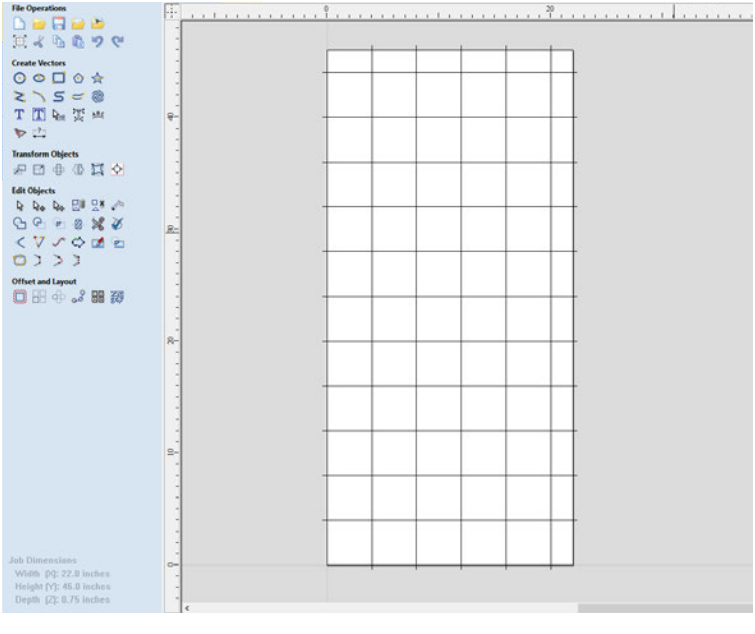


Fig 13a - Spoilboard CAD

13.2. Program a 5/16" (8mm) deep cut centered along each of the lines using the MATCHFIT Relief bit or any suitable 1/4" (6mm) straight bit.

13.3. Program a 5/16" (8mm) deep cut centered on the spoilboard rectangle line using the MATCHFIT Relief Bit or any suitable 1/4" (7mm) bit. (Fig 13b)

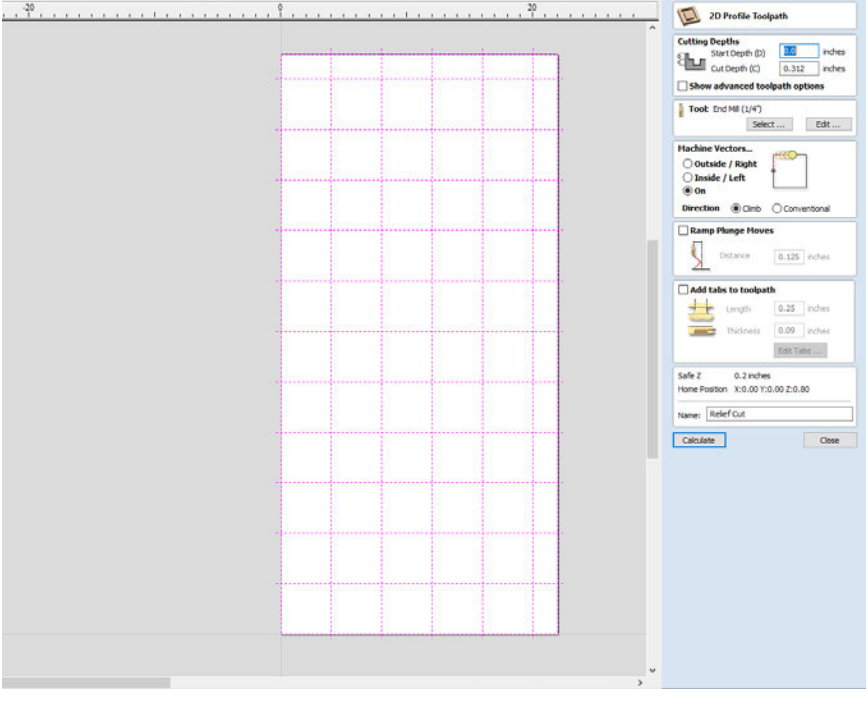


Fig 13b - Spoilboard CAM

13.4. Program a 3/8" (9.5mm) deep cut centered along each of the lines using the MATCHFIT Dovetail Router bit, or any suitable 1/2" (12.7mm) wide, 14-degree dovetail bit. This cut MUST be programmed with no ramp and at the full 3/8" (9.5mm) depth. (Fig 13c)

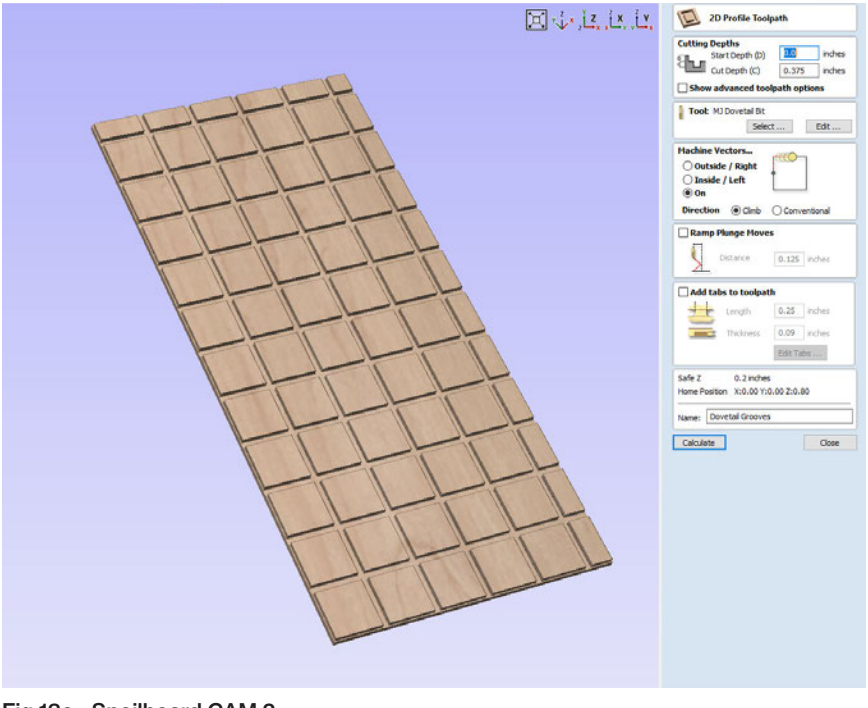


Fig 13c - Spoilboard CAM 2

13.5. Output these two G-codes to your machine.

13.6. Install the MatchFit Relief bit or other suitable 1/4" (6mm) straight bit into your CNC router and zero the Z height to the top of the MDF.

13.7. The X, Y origin point should be centered over the corner of your spoilboard. If not, return to Step 1.5 and set it.

13.8. Run the Relief Groove G-code program. (Fig 13d)

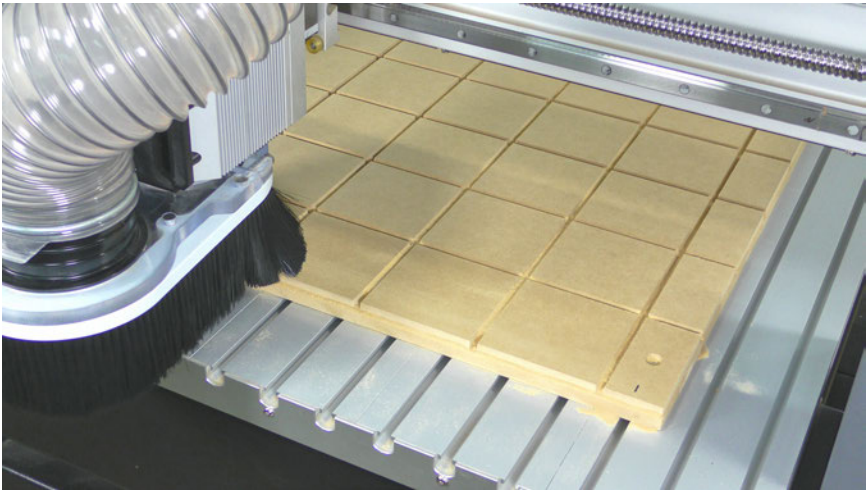


Fig 13d - Spoilboard Relief Cut

13.9. Remove the relief bit from the router and install the Dovetail bit.

13.10. Set the Z axis for this bit to Zero at the top of the MDF.

13.11. Using the same X,Y origin as the relief grooves, run the Dovetail Groove G-code program. (Fig 13e)

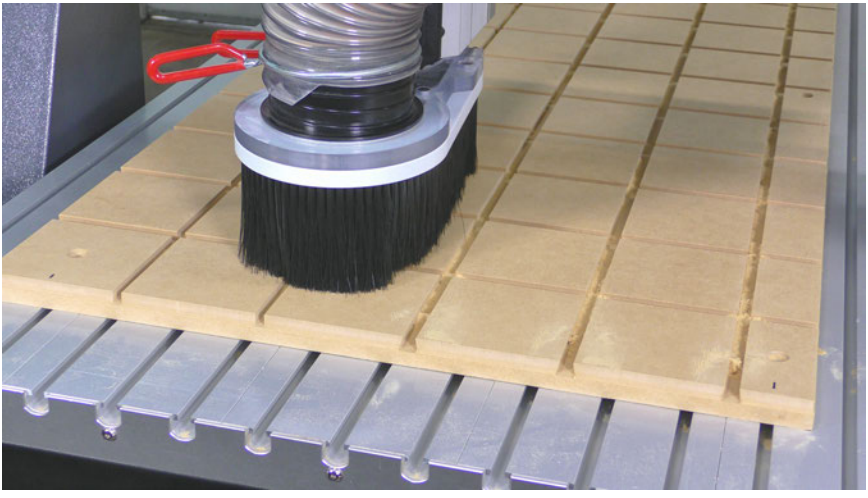


Fig 13e - Spoilboard Dovetail Cut

13.12. Your spoilboard should now be complete and ready to use with MatchFit Dovetail Grooves across the table and reference edges milled along the front and left edges.

⚠ Safety Note

When moving from one cut to the next (rapid travel) it can be hard to predict where the head might move. When using any type of clamps on your CNC machine, consider increasing the Z-Clearance setting for fast travel between cuts. We recommend setting this to 2.0" (50mm) when there is any chance of the head moving over a clamp position, especially with machines that return to X0, Y0 when a program finishes.

The operator is always responsible to read and understand the instruction manual for all their power tools. All machines must be set up according to the manufacturer's specifications, be clean and in good repair. Woodworking carries inherent risk, and it is your job to minimize your exposure.

If you need advice or have questions, email MicroJig at **support@microjig.com** or call our office at **+1 (855) 747-7233** 9am-4pm EST Monday to Friday.

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