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NEXT WAVE CNC

HD5 Squaring Guide

A CNC can become out of square and require adjustment. Ridges along either the X-axis, Y-axis, or both when surfacing or pocketing with a flat bottom bit is a common indicator adjustment is needed. This guide walks through the steps of tramming the router/spindle along Y then X to remove those ridge lines.

For the purpose of this guide; all testing, tramming, and surfacing will be completed on top of an unsurfaced spoilboard attached to the machine.

Tools Needed:

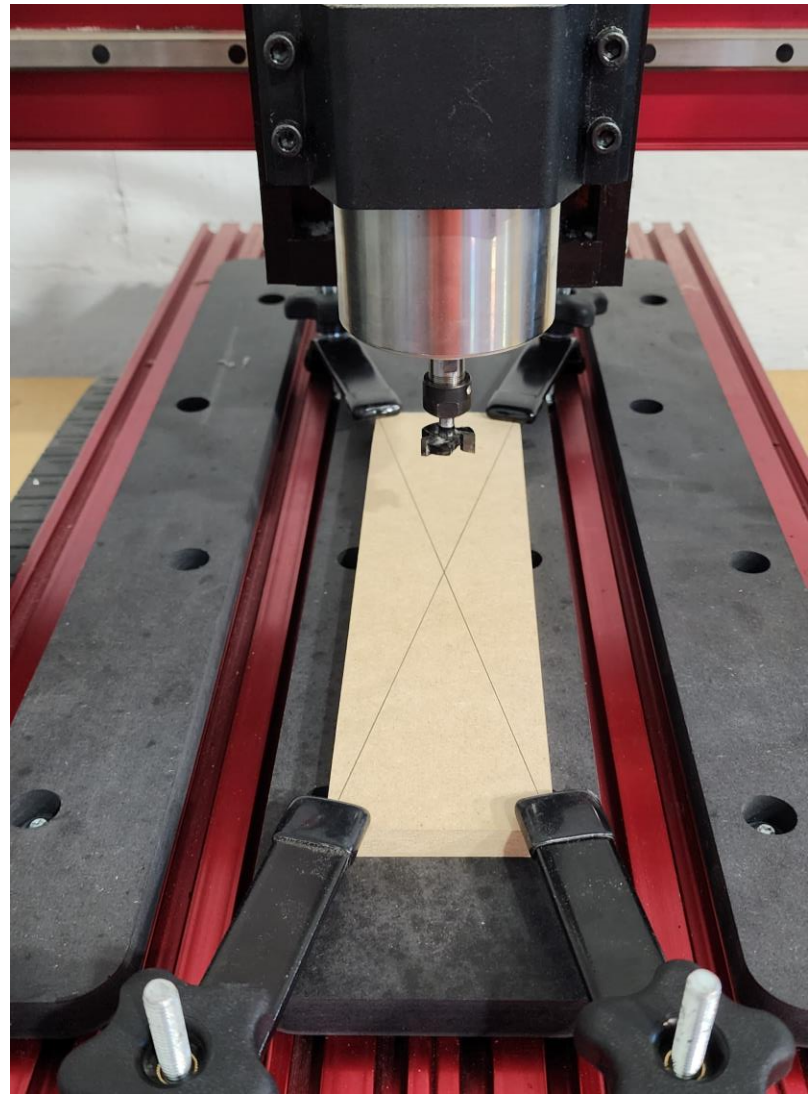
- Four 3”x12”x1/2” MDF (can be thicker)
- Aluminum foil or aluminum shim stock
- #5 Allen wrench
- #3 Allen wrench
- 1” planing or surfacing bit
- Machinist square or 1-2-3 block (optional)

Part 1: Y-axis tramming

Setup

The first step is tramming or adjusting the tilt forward or back along the Y-axis of the machine.

- Mark the Center of the 3”x12” MDF board, then place it on the machine with the 12” aligned parallel with the T-track slots.
- Clamp the material down at the edges, ensure an unobstructed 8” area in the middle.
- Move and zero the 1” surfacing bit to the center and surface of the material.

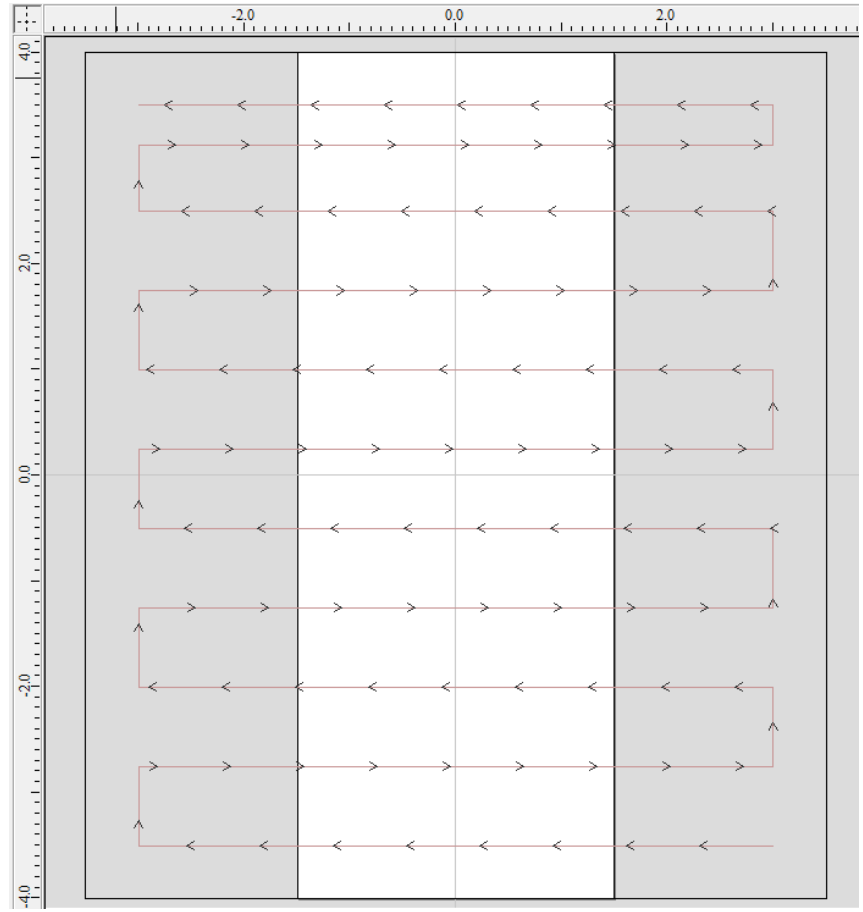


Y-axis tramming
Toolpath layout

Once the 1” surfacing bit is zeroed in X,Y, and Z, run “Y-tramming.tap” through the LCD Pendant or Ready2Control.

- The toolpath is designed with a 0.00-degree Raster for left and right movement
- The tool will travel off the material on each pass
- The tool uses a 75% step over

The file is designed in this manner to exaggerate and create ridges in one axis.

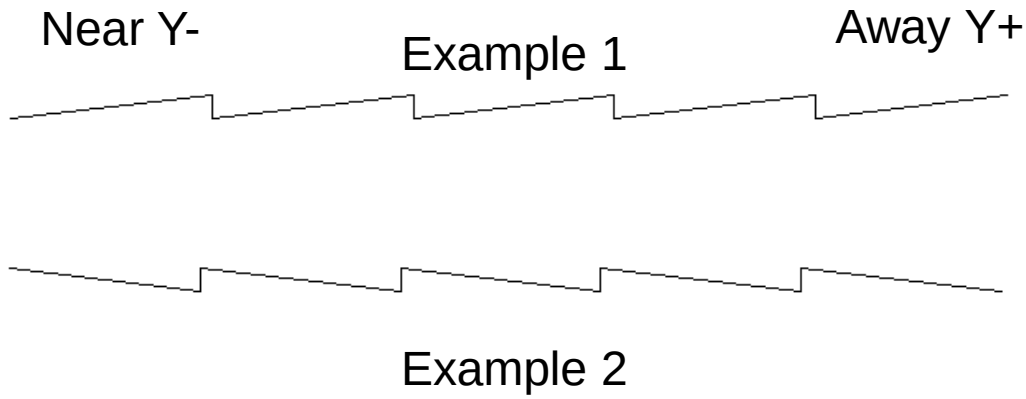


Y-axis tramming
Reading the ridges

Interpreting the horizontal ridges created when the toolpath has completed can sometimes be tricky.

The profile displayed in example 1 shows the front of the surfacing bit is lower than the back. You can feel this ridge with your fingernail moving back to front.

Example 2 shows the front of the surfacing bit is higher than the back. You can feel this ridge with your fingernail moving front to back.



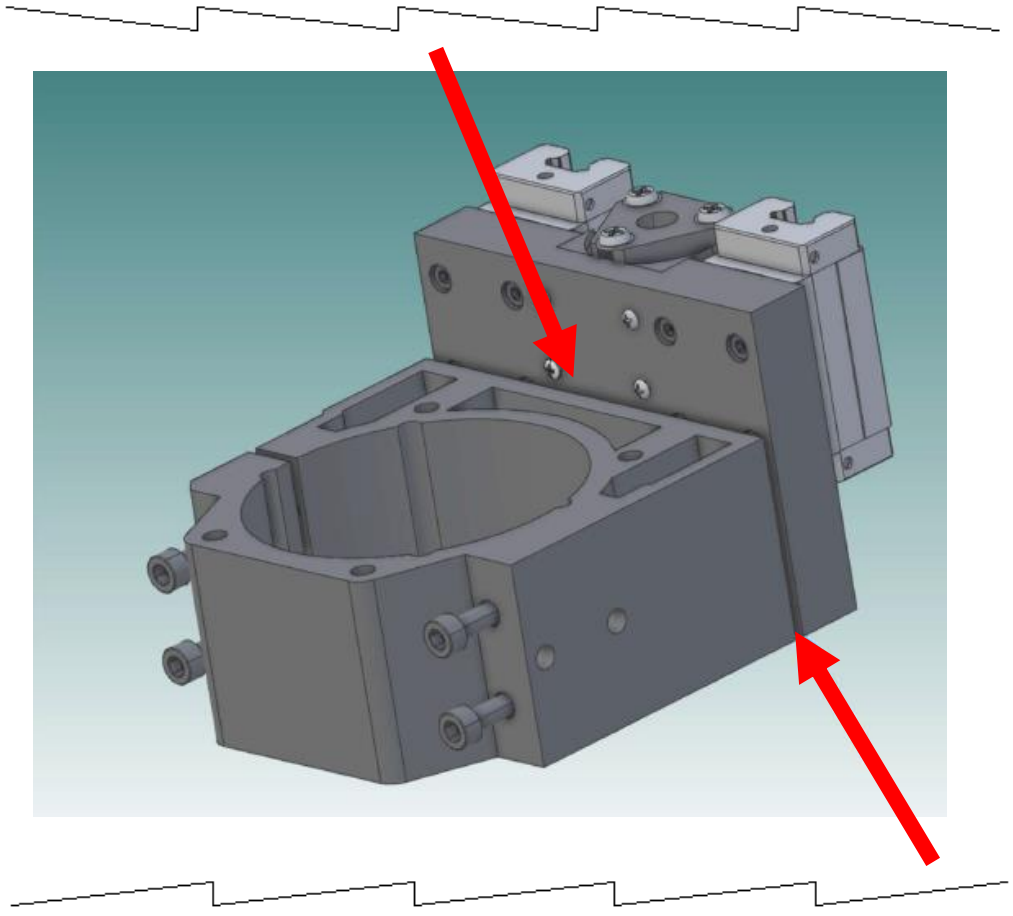
Y-axis tramming
Shimming

Loosen the clamp bolts using the #5 Allen wrench then place folded or layered aluminum foil or shim stock between the clamp and Z-axis bearing plate to correct the front or back pitch of the router/spindle.

- Ridge lines similar to Example 2 (top) are corrected by adding folded aluminum foil or shim stock at the top of clamp.
- Ridge lines similar to Example 1 (bottom) can be adjusted by adding folded aluminum foil or shim stock at the bottom of clamp.

Tighten the clamp bolts back into place.

Example 2



Example 1

Y-axis tramming

Repeat

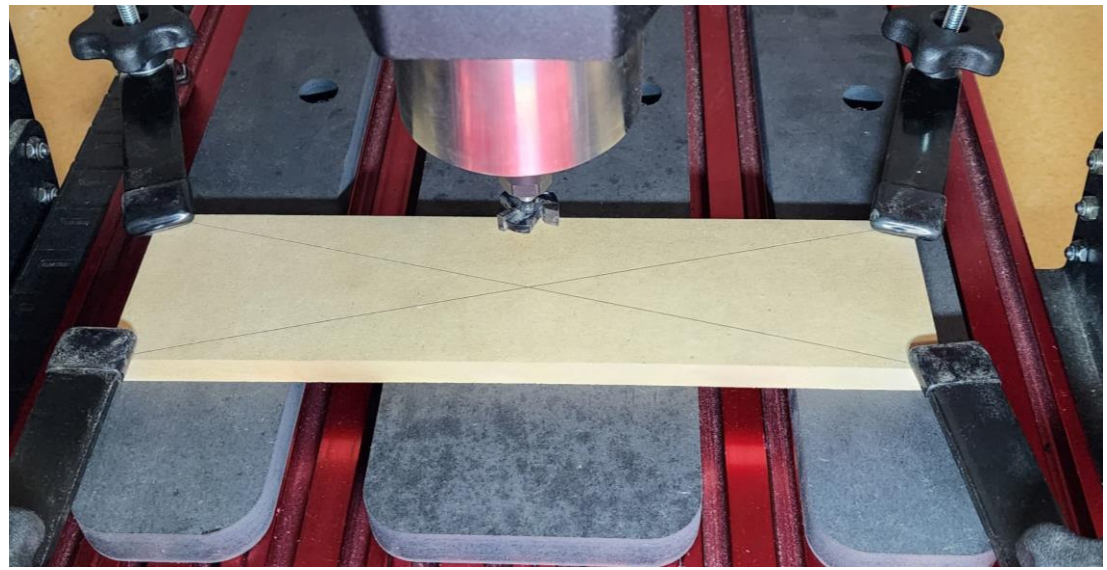
After shims have been added to the clamp, zero the Z-axis to the surface of the material then run Y-tramming.tap.

Repeat the process of tramming, zeroing the Z-axis, and running Y-tramming.tap until you can no longer feel the ridges.

Part 2: X-axis tramming
Setup

The next step is tramming or adjusting the left or right rotation along the X-axis.

- Mark the Center of the 3”x12” MDF board then place it on the machine with the 12” aligned left to right. (Perpendicular to the T-track slots)
- Clamp the material down at the edges ensuring there is an unobstructed 8” area in the middle.
- Move and zero the 1” surfacing bit to the center and surface of the material.

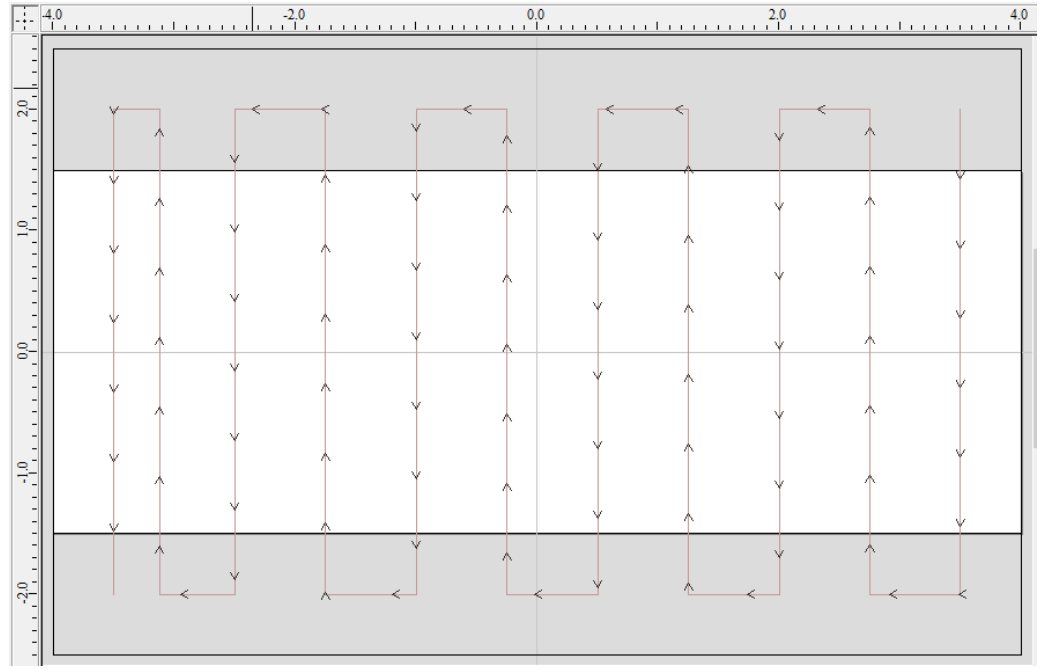


X-axis tramming
Toolpath layout

Once the 1” surfacing bit is zeroed in X,Y, and Z, run “X-tramming.tap” through the LCD Pendant or Ready2Control.

- The toolpath is designed with a 90.00-degree Raster for front to back movement
- The tool will travel off the material on each pass
- The tool uses a 75% step over

The file is designed in this manner to exaggerate and create ridges in one axis.

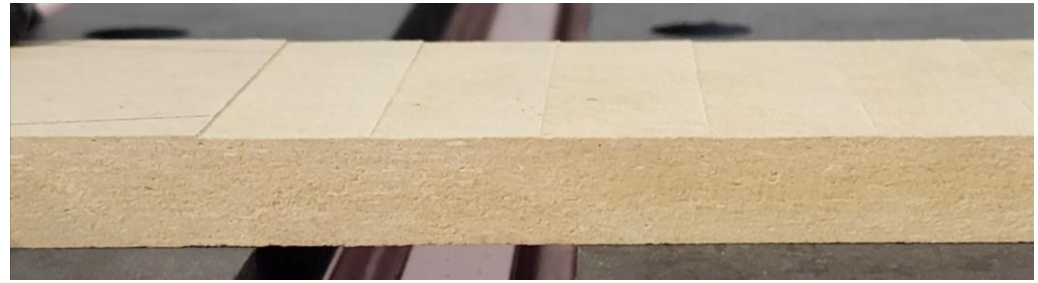


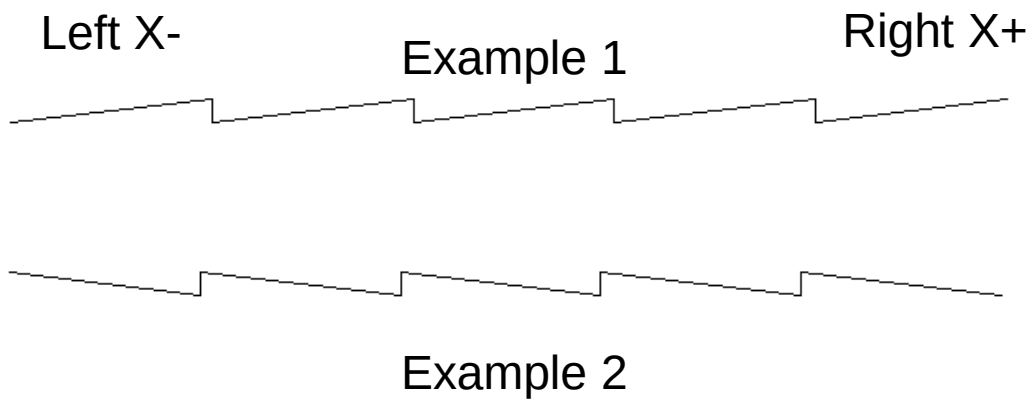
X-axis tramming
Reading the ridges

Interpreting the vertical ridges left when the toolpath has completed can sometimes be tricky.

The profile displayed in Example 1 shows the left side of the surfacing bit is lower than the right. You can feel this ridge with your fingernail moving right to left.

Example 2 shows the left side of the surfacing bit is higher than the right. You can feel this ridge with your fingernail moving left to right.



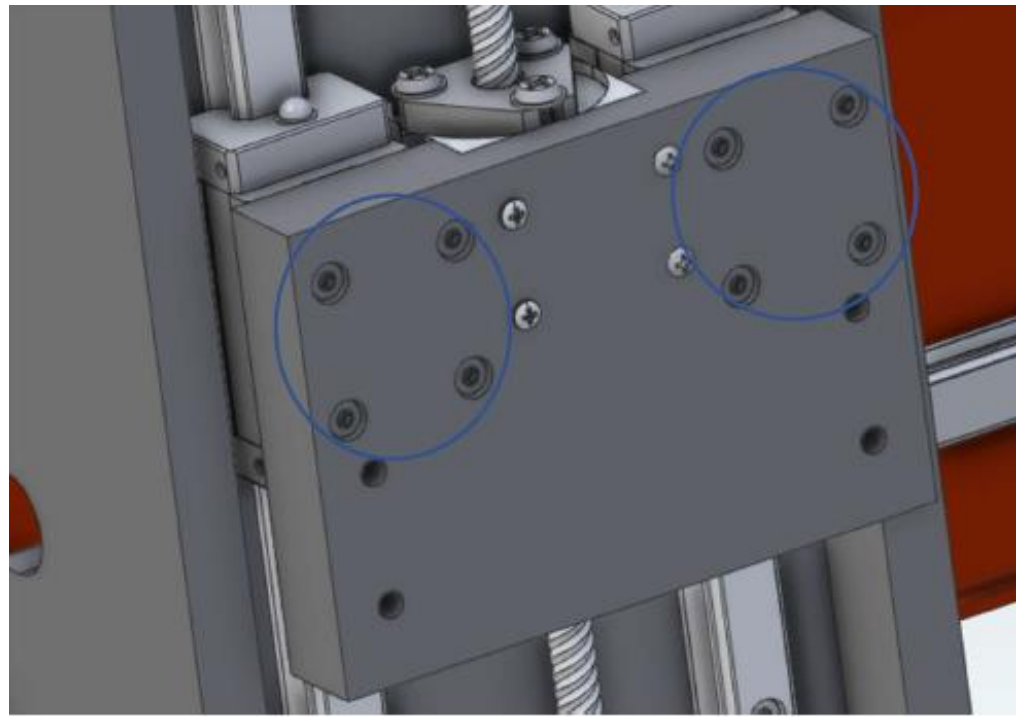


X-axis tramming
Process Overview

Tramming the X-axis includes several more steps than tramming the Y-axis. The following pages will detail these steps.

The steps are:

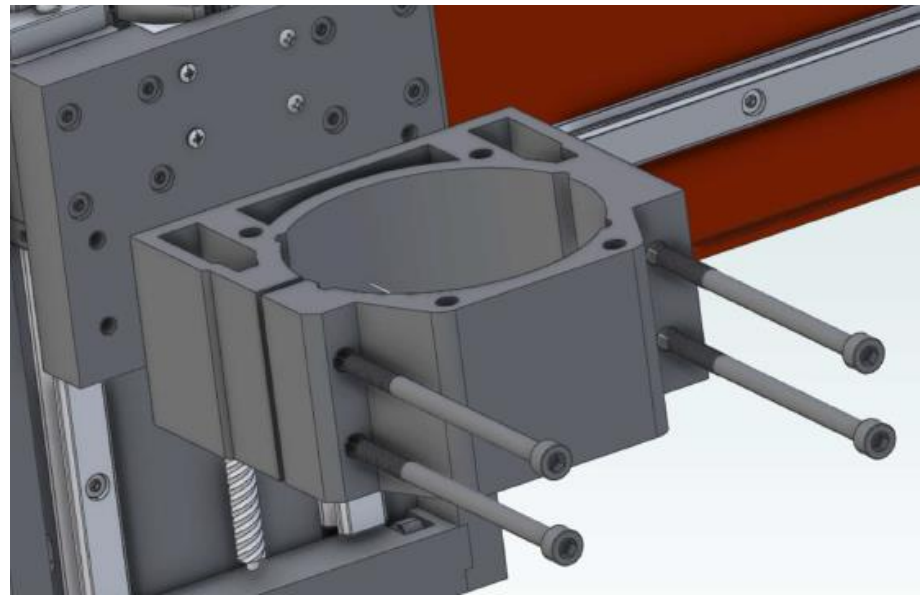
1. Remove the aluminum clamp
2. Loosen the eight machine screws circled in blue using
3. Rotate bearing block clockwise or counterclockwise (widdershins)
4. Tighten the eight machine screws
5. Install the aluminum clamp back onto the bearing block along with the shims added during Y-axis tramming
6. Run “X-tramming.tap”



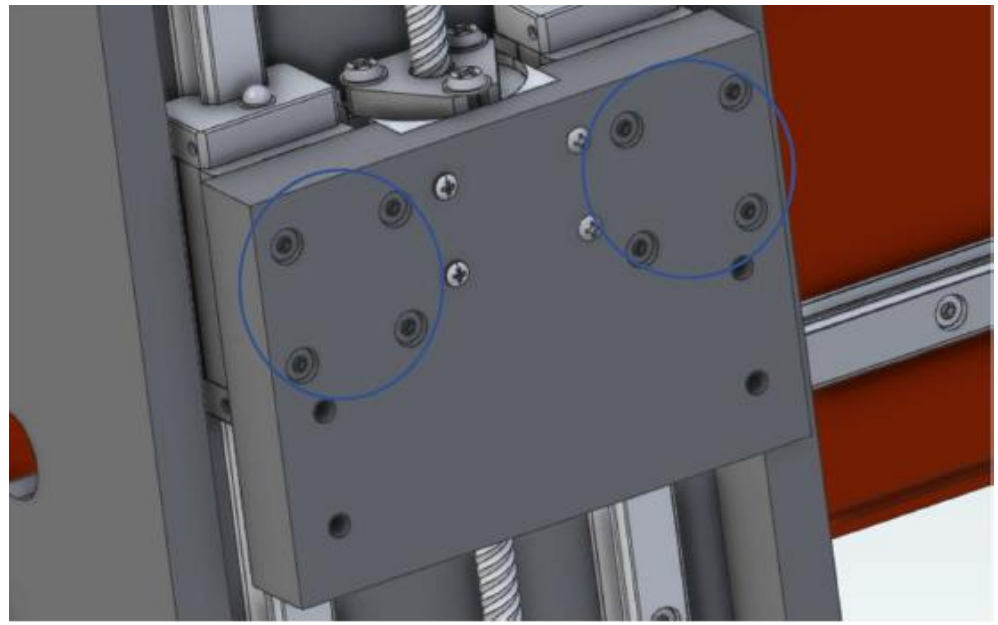
X-axis tramming

Remove and loosen

1. Using a #5 Allen wrench remove the aluminum clamp router/spindle clamp.



2. Using a #3 Allen wrench, loosen, but do not remove, the eight machine screws holding the bearing block to the Z-axis bearings.

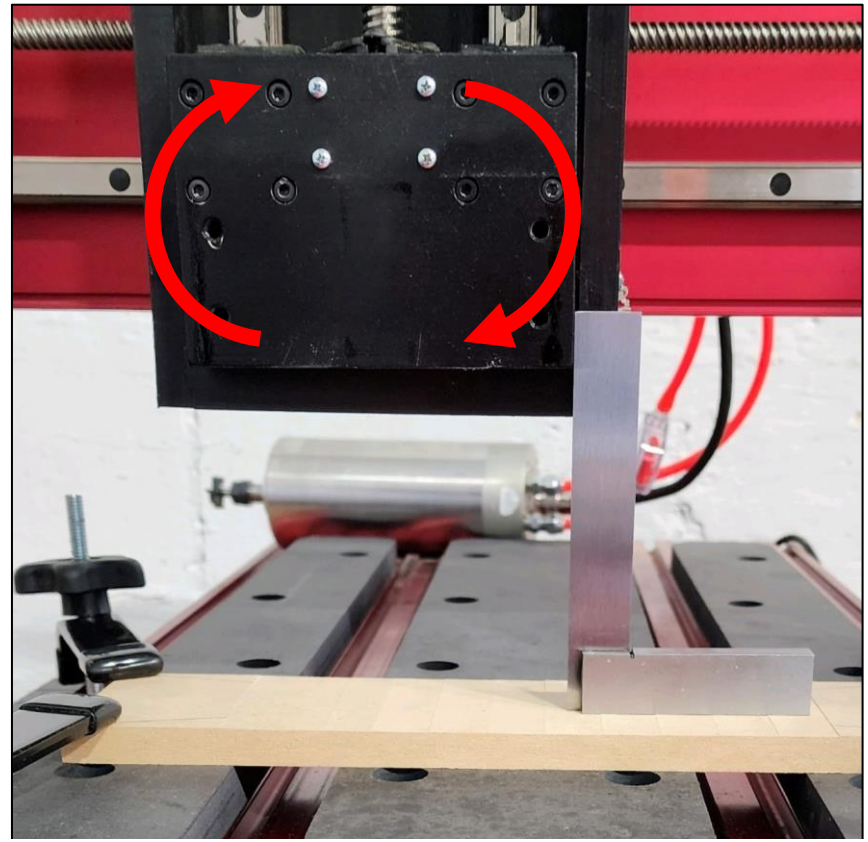


X-axis tramming
Adjusting for Example 1

The profile displayed in example 1 indicates the left side of the bit is lower than the right.

3. Rotate the Z-axis bearing block clockwise until the tilt is corrected.

4. After rotating the bearing block, tighten the eight machine screws to lock the bearing block in place.



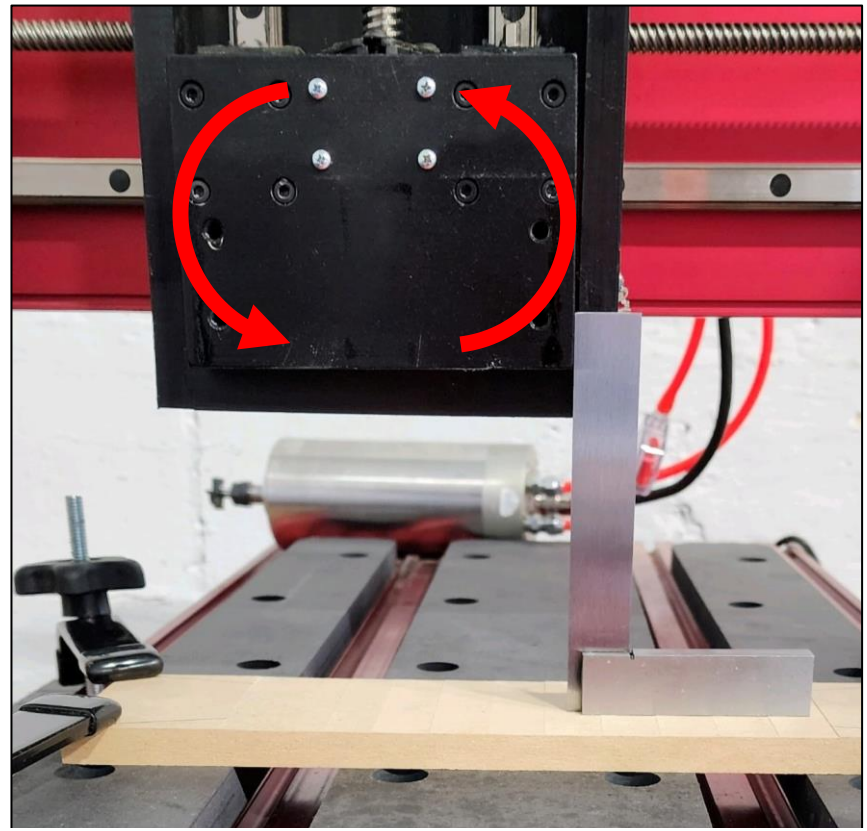
Example 1

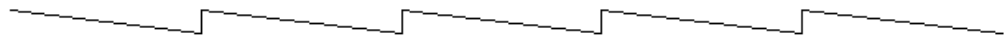
X-axis tramming
Adjusting for Example 2

The profile displayed in Example 2 indicates the right side of the bit is lower than the left.

3. Rotating the Z-axis bearing block counterclockwise until the tilt is corrected.

4. After rotating the bearing block, tighten the eight machine screws to lock the bearing block in place.

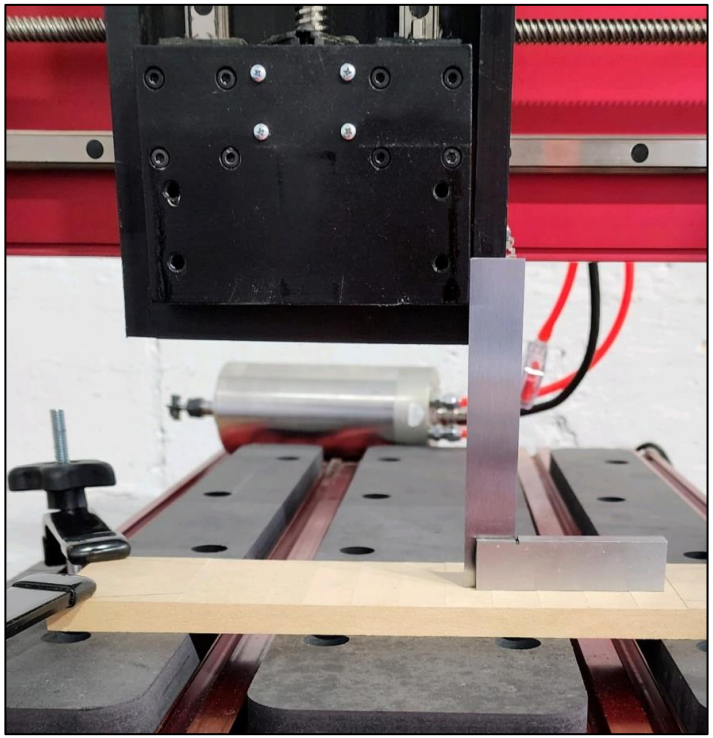




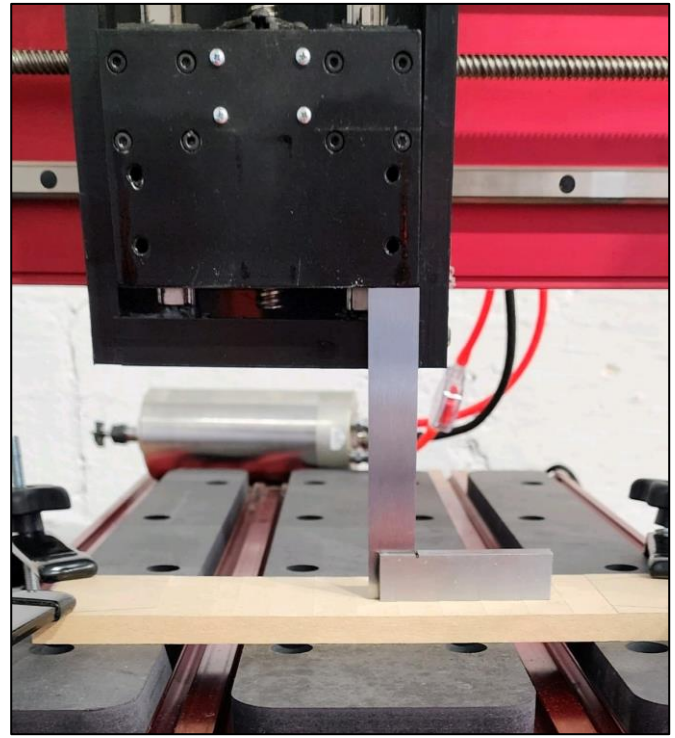
Example 2

X-axis tramming
Tips

A machinist square or 123 block can be helpful for tramming alignment. Bring the sides of the bearing block flush with the edge of the square to measure tramming.



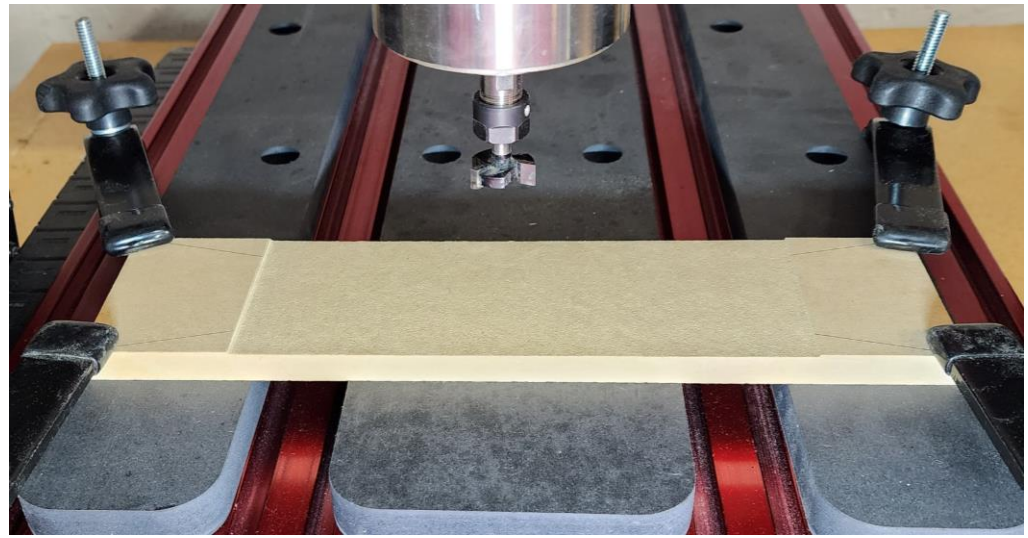
To make small adjustments or to hold the bearing block in place, bring the right of left side of the bearing block down onto the square.



X-axis tramming
Repeat

5. Install the clamp onto the Z-axis bearing block along with the final shim(s) used during Y-axis tramming.

6. Zero the Z-axis, execute “X-tramming.tap”, and repeat tramming steps until you can no longer feel the ridges.



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