

X-Carve 100mm Maker Slide Modification

This is a long read but I wanted to be thorough. Sorry to say, I did not take any pics while making the mod, however it is not difficult at all. I will take some pictures of the final result and post them here later today. You just need to work slowly and deliberately to insure that everything stays in alignment. Below are the steps I took to complete the "Upgrade".



Before you start, power your machine up and check to see just how much flexing or twisting the Maker slides have by pulling forward on the bottom of the spindle and pushing backward on the top at the same time. Don't go all gorilla here, don't want to break anything! You will find that the bottom of the spindle moves far more than would be desired. (Powering it up will help to hold things still while you check this). Repeat this at the end of the upgrade and be amazed at the difference!

This is for the 1000mm X-Carve

Materials needed:

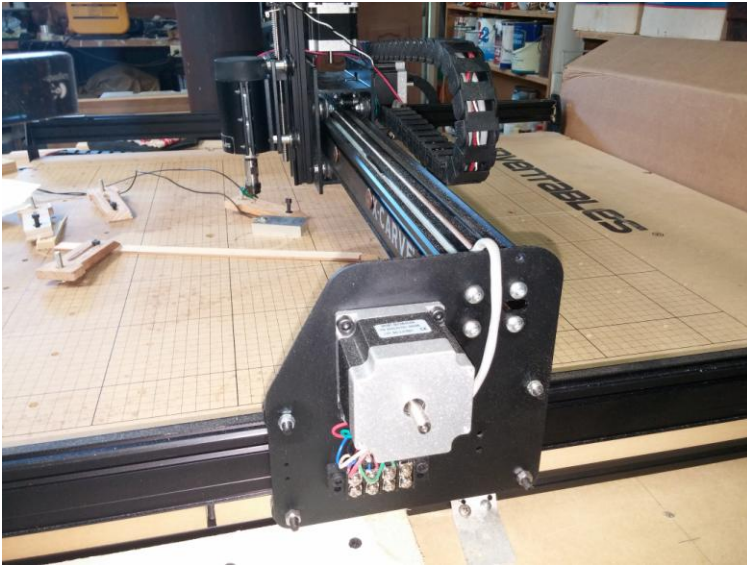
Go to [Lowes.com](https://www.lowes.com) and put in the item numbers listed below in the search box.

(1) 1 piece of 3/16" by 3" by 48" flat bar steel. I got mine from Lowe's for about \$24. Must be cut down to 2 1/2" tall though. You can get one that is smaller than the 3" stock but I wanted to get the maximum stiffness possible. Lowe's Item Number 215877.

(2) Furniture connecting bolts and nuts with the appropriate size drill bits. These will require two drill bits because the nuts are a larger diameter. I purchased the 50mm length bolts which were about a 1/2 inch too long so I cut them off with no problem. Lowe's item numbers 148248, 148284. My local Lowe's carried both in dark bronze color so they look good on the machine. Standard size nuts and bolts have to thick of a head on them and will bind with the spindle carriage. Furniture or elevator bolts have a lower profile head and will clear the inside hardware of the spindle carriage.

Steps to complete.

1.) Cut the flat bar steel to about 39 1/4 " long (for the 1000mm x-carve) and no more than 2 1/2 inches wide. I took mine to a local machine shop with a sheer press and they cut it in about 2 seconds and didn't charge me anything.



2.) Disconnect the wiring that goes through the x axis rail to the second y stepper motor and pull the wires back out of the rail. Leave it connected to the left side.

3.) Loosen the 4 eccentric nuts on the x carriage so that there is no pressure on them. Remove the 4 screws that attach the rails to the end plate on the right side where you just removed the wires. Support the rails on both ends with some scrap lumber to insure that they don't fall to the waste board and bend something.

5.) With the left side of the rails still attached, gently lift the right end of the rails upward and slide the steel in between them and then through the spindle carriage then lower the rails back to their original position. Reinstall the 4 screws that hold the rails in place. No need to get them tight yet.



6.) I used 4 padded bar clamps to insure that nothing moves. Slide the spindle carriage all the way to the left (the side that has not been disconnected yet). Position the steel on the right side of the machine so that the top of the steel is flush with the top of the rails and clamp it together about 2 inches from the end. Then slide the carriage as far to the right as you can and adjust the steel on the left side so that it is flush with the top of the rails also and add another clamp about 2 inches from the end. This may require a couple of adjustments to complete.

7.) When you have then ends of the rails clamped and the steel is flush with the top, slide the carriage back and forth to insure that there is no binding. When all is good, move the carriage all the way to the left (against the clamp). Then start adding more clamps along the length of the rails. You don't want this to move when it is removed. Finally, remove the clamp at the far left side, slide the carriage all the way to the left against the end plate and re-clamp next to the carriage.

8.) On my machine, I have the drag chain connected to the left Y plate. The screws holding the rails being modified also hold the bracket for the drag chain. There is no need to remove any other wiring, just handle the spindle carriage with care when removing it.

Now remove the 4 screws from both ends of the rails that hold them in place. Gently lift the assembly out being sure that you have a firm grip on the spindle carriage.. it bights. Once lifted out far enough, slide the spindle carriage off of the rails and carefully set aside.



9.) You should now have the two "Maker Slides" in hand, clamped together with the 3/16 steel spline in place. I used a drill press to drill the holes but a hand drill should work. From the front, drill a hole all the way through all three pieces at one end with the appropriate sized bit for the bolt, then drill the opposite side with a larger bit through the back rail only

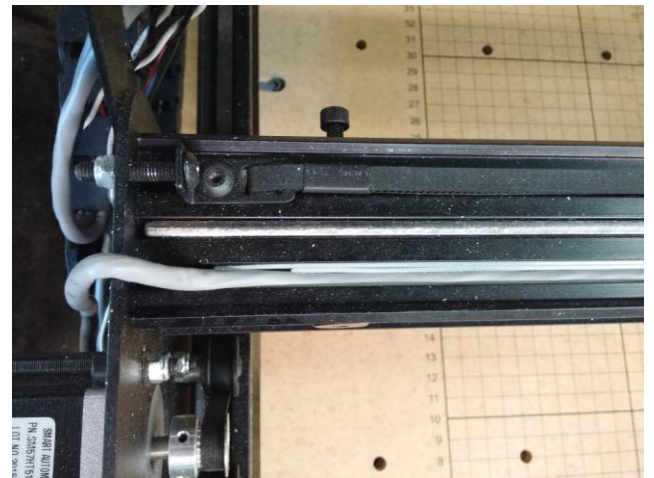
being careful not to go through the steel to accommodate the nut. Insert a bolt and nut, tighten securely. If you did a good job of clamping and you are certain that nothing moved during this process then move to the opposite end of the rails, drill and bolt one more time.

At this point you should have the rails bolted together at both ends only. Remove all the clamps and reinstall the assembly with the spindle carriage back on the rails. Temp install the 4 screws on both ends and check that the spindle carriage moves freely from side to side.

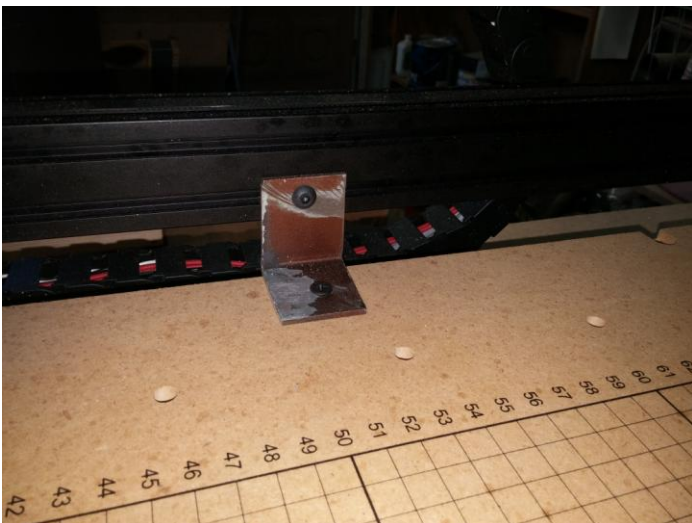
10.) Assuming that the carriage moves freely, remove the assembly again and add the remaining bolts to the rails. I used a total of 7 bolts through the rails which seems to be working very well. Some thread lock might be a good idea but I didn't use any. They seem to be staying tight so far.

11). Reassemble everything back the way it was and tighten everything back up. The steel will block access to the screws for the eccentric nuts. I had to use some vice grip pliers to grip the end of the screws so I could adjust the eccentric nuts. Not ideal but well worth the added rigidity.

12. Route the wiring for the second y stepper motor in the slot on top of the front rail. You will have to pass this over the top of the end plates unless you want to drill a hole in them. This is the same slot that the belt occupies on the rear rail. To insure that it doesn't pop out, I cut some zip tie pieces and pushed them into the slot to make it a tighter fit. They don't show and it looks fine, plus you don't have to add longer wires to run around the machine.



Once everything has been reassembled, slide the spindle carriage side to side by hand once more to insure that there is no binding. If all is good, which I am sure that it will be, power the machine up and then test the flexing again and be amazed at how much more rigid it is.



One other area that needs attention is the long Y rails. To insure that these don't bow under load I installed one L bracket at the mid point of each rail. I used some angle iron to insure that I had a good solid anchor for them. A word of caution. Be sure to position the brackets firmly against the rails. You as don't want to cause the rails to bow in / out / or downward when tightening them.

I took my time doing this because I had no clear instructions to follow and certainly didn't want to make a mess of my new machine. I feel certain that I could do it again in about 2 hours or less knowing what I know now. This modification will not turn the x-carve into a heavy duty milling monster, but it will greatly reduce the chatter caused by the flexing issue that comes with the stock version of the 1000mm x-carve, which I absolutely love by the way! I can now mill the 1/2 thick aluminum and get a good result.



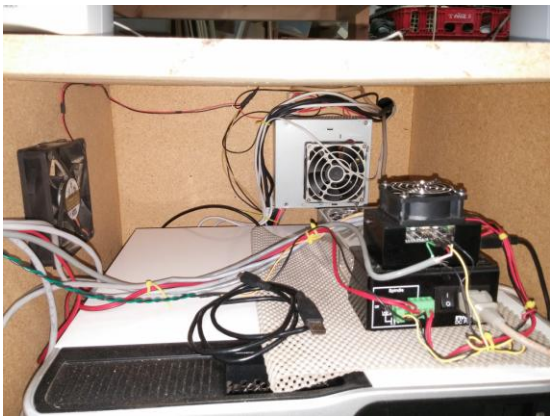
I hope this helps anyone who is considering making this modification. I don't remember who posted the fact that we can use the 3/16 thick steel for a spline but I did read it on this forum and don't take any credit for this discovery. Same for the furniture bolts. I'm just posting the procedure I used and the results I achieved.

Here are some other pictures of things I incorporated for my X-Carve.

Below is my work table for the X-Carve. I incorporated a cabinet for all the computer and power supply for the machine. Even have some speakers for a little Pandora while I'm working... Gotta Luv it!



When running the machine I keep the doors closed to keep the dust and debris out of the sensitive electronics. This includes an air filter and both a suction and blowing fans to circulate the air inside the cabinet.



I also made a Z-Zero touch plate out of a piece of 1/2 inch aluminum. Simply attached a wire to it and to the appropriate pins on the Arduino and bingo, perfect Z Zero every time.

