Construction of a new CNC Router

Constructed by John Horne & William Beatty

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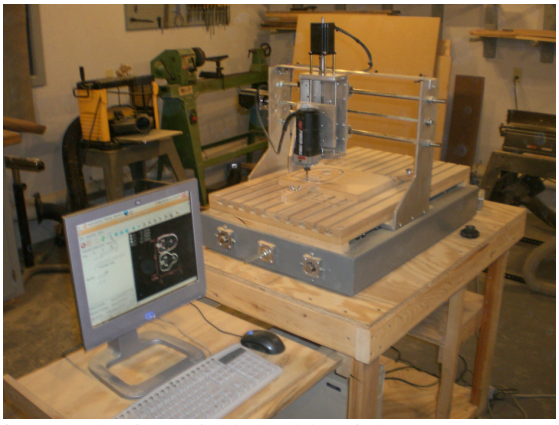
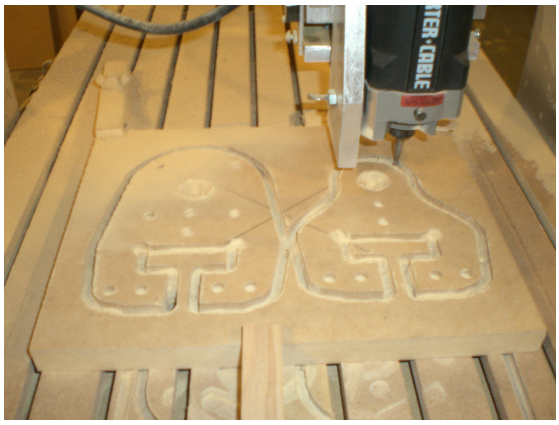
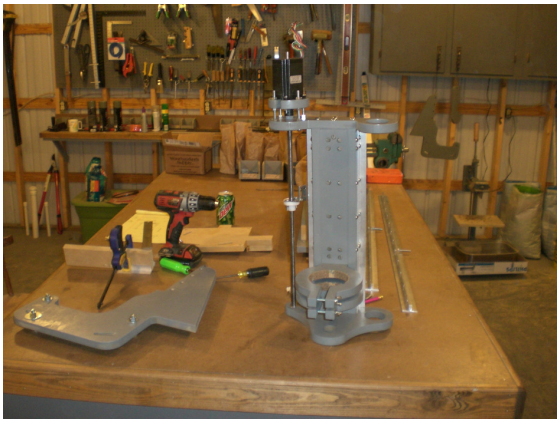
A couple of years ago I constructed a CNC router out of mostly aluminum with a wood cutting table. I done a lot of research and used linear bearing for the Y axis and roller bearings for the X and Z axis. This yielded a fairly good cutting machine but overall the size of the cutting range was small (approximate 12" x 16"). I purchased the electronics and stepper motors package from HobbyCNC and had no problems with the build thanks to the help of William Beatty, a friend and co-worker. William assembled the kit and helped in the setup and configuration of the EMC control software. Several problems arose with limit switches and motor couplers. We constructed new couplers which corrected the problem of slippage. Limit switches at this time have not been resolved but I feel we will solve the problem. In research to solve the limit switch problem, we found adding a .01 capacitor across the input and using shielded cable might correct the problem of false triggering.



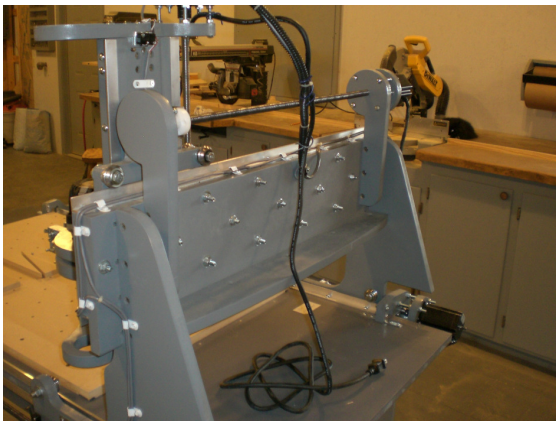
With such a small cutting area on my CNC, I decided to build a larger machine. My decision was due to finding a web site buildyourcnc.com. This web site has great design ideas that give a very rigid and easy constructed machine. The design also included adjustable bearings which would allow for small discrepancies in the build. With this in mind, I ask William if he would help in the build. With his help, we started studying the videos on buildyourcnc.com to develop the drawings for the many parts required. We used a free program, emachineshop to draw all the parts that had to be cut and CamBam to turn the drawings in G code. We used our existing CNC machine to cut most of the parts.



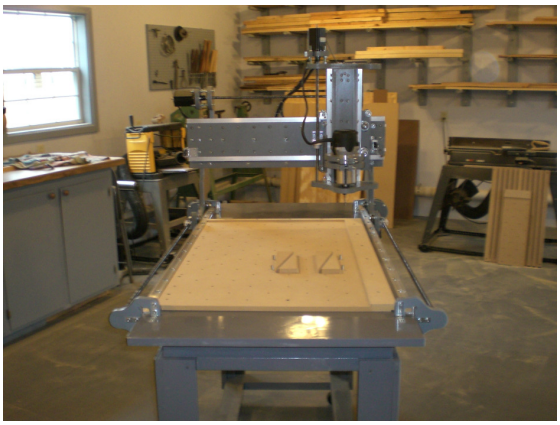


The larger pieces had to be hand made due to the limited cutting area of our existing machine. We used the stepper motors and controller from the first machine on the new one. We added another axis driver to the controller to support the dual stepper motors on the X axis. All the special parts; lead screws, v-groove bearing, and couplers were purchased on line from various suppliers.
All the other items were purchased locally from building and hardware suppliers.

We had to make a few changes along the way to allow the using of lead screws that were milled down to allow for ¼ " bearings on each end. With a 24" lead screw length, we ended up with a little over 21" of cutting area on the Y axis. This was

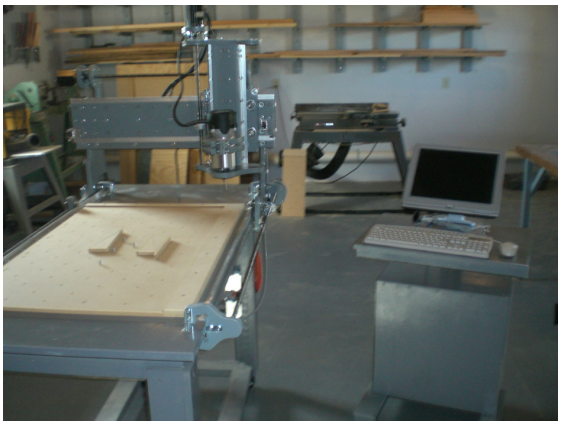


accomplished by setting in the lead screw support brackets.



A torsion box constructed table was made with casters to allow for movement in my shop. The controller was installed under the table to allow for cabling ease. Motor wiring was routed to one side and limit/home switches wiring to the other side. Ferrite cores were installed on the limit/home switches control cabling. Capacitors (.01) were added to the inputs of the limit/home switches. With all of this we still had false triggering of the limit/home switches on the Z axis when the router was running. We programmed EMC2 to filter the home/limit switch inputs which eliminated the false triggering. After all of this we found that we had a limit switch that had a weak spring. The filter took care of the false triggering but we replaced the limit switch anyway.

We also constructed a portable computer cart that would allow us to store the computer inside one of the shop cabinets when not in use. This will help keep the computer out of way and cleaner. Cable hook-up will consist of only connecting the power and parallel cables which makes startup very simple.



In conclusion we used most of the ideas we found on buildyourcnc.com. The web site, buildyourcnc.com was instrumental in the construction of our new CNC machine.

Additional photos of the finished machine: