Milling Machine

Combining hobbies created an entirely new hobby for me (and another money pit). I was looking for a way to easily make cools brackets and parts for my RC Helicopters. Being an electrical engineer I started looking at CNC milling machines. To my surprise there were some affordable machines on the market directed at hobbyists. After spending w few months researching on the net I finally decided on the Taig micro mill.

Taig Tools

This is a 3 axis milling machine with 12" travel on X-axis, 5.5" travel on Y-axis, and 6" travel on the Z-axis. Not much but for a hobby machine I felt it was adequate. It had the largest travel of all the machines in my price range which was the primary decision the purchase of this model. I also purchased the 4th axis rotary table.

This machine came complete with controller ad 100oz stepper motors. It came with DOS based controller software. The software communicates to the controller through the PCs parallel port.

Although this system worked ok it was very limiting being dos based. It had very few features and only worked for basic machining. As I got into making more advanced parts I needed some more features.

I started looking for a different PC based CNC controller and stumbled on one called Master 5 from Art Soft . This was a very feature rich program. Its has a free version that allows full use of the software but is limited to 1000 lines of G-Code. This allowed me to get a full system working before purchasing a full license which was very reasonably priced. This is also a windows based program which allowed me to run the machine while connected to my home network. I very big advantage as I do all my CAM work on a different computer. Being able to load the G-Code from a remote share was worth this change in itself.

Unfortunately Master 5 was not compatible with the controller for my CNC machine. The Taig used what is called wave control but Master 5 used step/direction control. Basically, the stepper motors use two wires to control their motion. Normal controller use step/direction where one pin controls the direction of motion and the other is used to control the motion itself. One pulse on the step pin cause the motor to advance one step. The Taig's wave control requires a waveform to be placed on but lines to control the steppers motion.

To get Master to function I had to build a new controller. I choose to purchase some controller boards from Xylotex . I purchased a three axis module and a single axis module. After building a custom enclosure and wiring it to the original steppers I was able to get Master5 functioning. This was huge improvement.

Master5 was continuously being developed and evolved to a program called Mach2 and now is called Mach3.

Lathe

When I bought my milling machine I also bought a Taig micro lathe. This was a manual lathe and I did make a lot of simple parts using it. However, for what I wanted to make a CNC lathe was required so I purchased a used MaxNC lathe . It took a while to figure out but managed to make a parallel port adapter and configure Mach3 to also drive this lathe. This lathe has encoders on the steppers and on the spindle. Having an encoder on the spindle made it possible to create threads. Unfortunately, the controller was not compatible with Mach3.

The controller used in MaxNC lathe is the same controller used on their milling machine. Therefore it has capabilities to control 3 axis even know the lathe has only 2. Each axis is controlled by its own processor. The spindle encoder was wired to one of these processors. Luckily the processor was a Microchip PIC 16C84 which I was quite familiar with. I wrote some custom firmware for this processor to generate a index pulse every time the spindle made one revolution. After a couple jumper wires were added to the controller board I was able to feed this index signal to PC.

Now I was able to control the spindle speed using Mach3 and also use thread cutting g-codes. Unfortunately you have to run the spindle quite slow for cutting threads and at these speed it

has very little torque so I have not had much success at cutting threads.