

How to Make a Three Axis CNC Machine (Cheaply and Easily)

by [oomlout](#) on June 29, 2007

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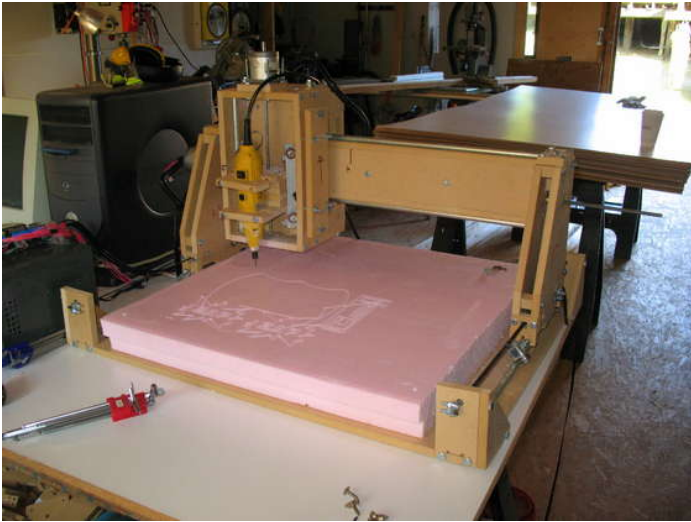
Intro: How to Make a Three Axis CNC Machine (Cheaply and Easily)

The idea behind this Instructable was to fulfill my desire for a desktop sized CNC machine. While it would have been nice to purchase an off the shelf unit the issue of price as well as size proved prohibitive. With this in mind I endeavored to design and build a three axis CNC machine with the following factors in mind:

- Use Simple tools (needs only a drill press, band saw, and hand tools)
- Low Cost (this kind of got away from me however with everything bought off the shelf the cost for all parts is under \$600 (significant savings could be made by skillfully sourcing some pieces))
- Small footprint (30" x 25" footprint)
- Usable working envelope (10" X-axis, 14" Y-Axis, 4" Z-Axis)
- Relatively fast cut rate (60" per minute)
- Small part count (fewer than 30 unique parts)
- Easy to source parts (all parts available from 4 sources (Home Depot + 3 online sources))
- Ability to cut ply-wood (Successful)

Lets get started...

UPDATE: - Coming soon the ability to order pre-cut MDF pieces from [oomlout](#)



step 1: Others Who Have Finished

A salute to those who have laboured through to this point (and to demonstrate that it is reproducible) Here are some pictures of other peoples machines.

Photo 1 - Chris and his friend put together this unit; laser cutting the parts out of half inch acrylic. Not only does it look super it must weigh a ton. But kudos, anyone who's worked with acrylic knows laser cutting it is great but it is a very very unfriendly material to drill and there is a lot of side drilling in this design. Good job guys, check out more details (and photos including some testing with circuit boards) on Chris's blog [rainbowlazer.com](#) . I particularly like his work with making 3-d objects out of 2d cuts ([here](#)) .

Photo 2 - Sam McCaskill has finished his desktop CNC machine and it's looking really really nice. Super impressively he also resisted the urge to cheat and cut all his pieces by hand. I'm really impressed.

Photo 3 - Angry Monk's - With MDF pieces cut on a laser cutter and drive converted from toothed belts to threaded rod

Photo 4 - Bret Golab's - Bret has completed his and gone through the extra step of getting it setup to work with Linux CNC (a task I attempted and was foiled by complexity). If you're interested in his settings you can send him a message (Instructable ID: [bretlyssii](#)) . Great job Bret!

(If you have built one and would like it featured here, please send me a PM and we can arrange for the sending of photos)

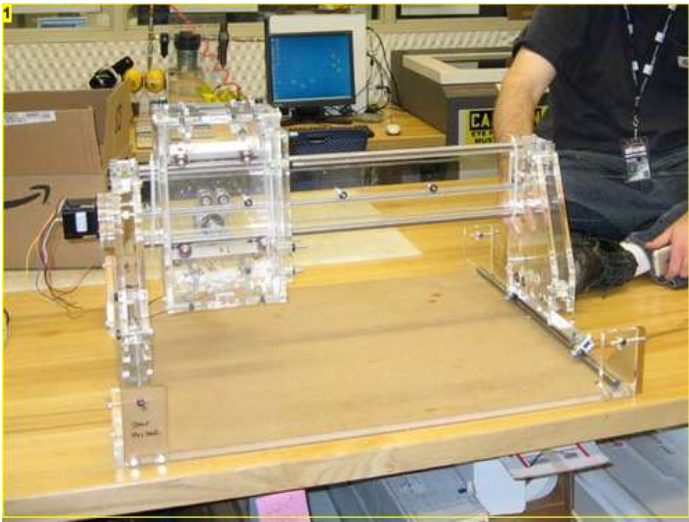


Image Notes

1. Cris and his friends finished CNC machine. Check out more details about this build at RainbowLazer.com

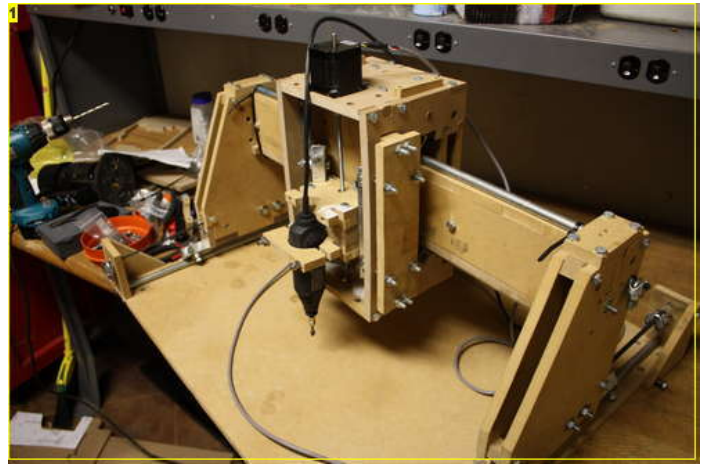


Image Notes

1. Photo 1 - Sam McCaskill's Finished (handcut) Machine

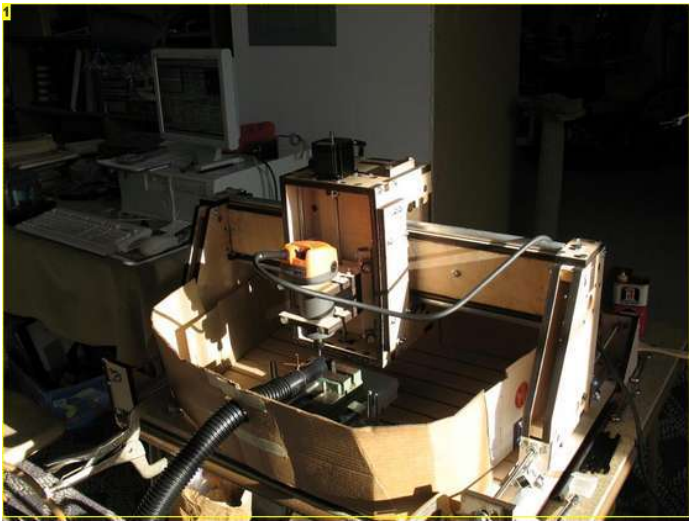


Image Notes

1. Photo 2 - Angry Monk's Finished Machine.

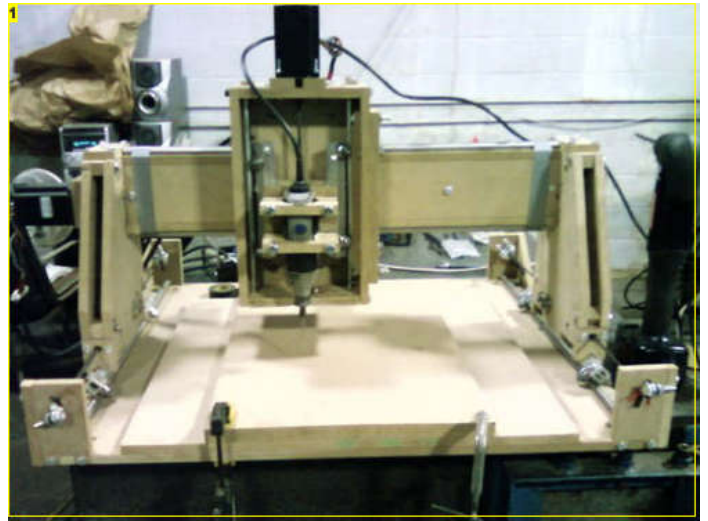


Image Notes

1. Photo 3 - Bret Golab's

step 2: Specs.

I'm afraid I don't have the space (or the expertise for that matter) to go into the fundamentals of CNC here but there is one websites in particular I found quite useful in my research.

CNCZone.com - A discussion forum which has a DIY machine section which is a wealth of knowledge ([direct link](#))

Machine Details:

Cutting Head: Dremel or Dremel Type Tool

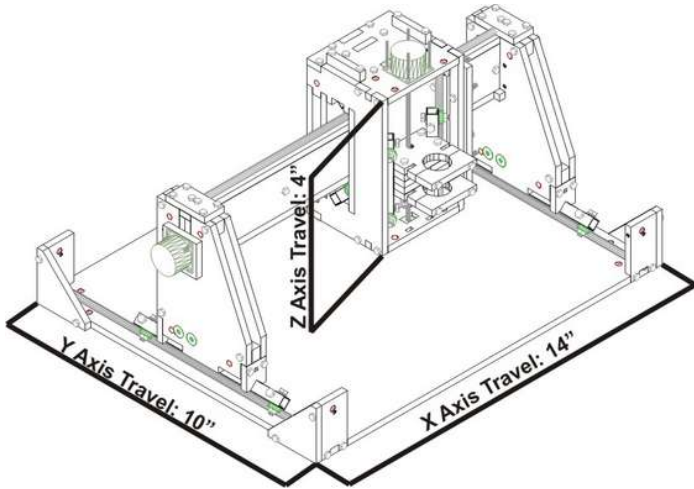
Axis Details:

X Axis
 travel: 14"
 Drive: Toothed Timing Belt
 Speed: 60" min
 Acceleration: 1" per second²
 Resolution: 1/2000"
 Pulses Per inch: 2001

Y Axis
 Travel: 10"
 Drive: Toothed Timing Belt
 Speed: 60" min
 Acceleration: 1" per second²
 Resolution: 1/2000"
 Pulses Per inch: 2001

<http://www.instructables.com/id/How-to-Make-a-Three-Axis-CNC-Machine-Cheaply-and/>

Z Axis (up down)
Travel: 4"
Drive: Threaded Rod
Acceleration: .2" per second²
Speed: 12" min
Resolution: 1/8000"
Pulses Per Inch: 8000



step 3: Required Tools

The goal was to try and keep the tools required within the realm of an average handyman's shop. Power Tools: -Band Saw or Scroll Saw -Drill Press (drill bits 1/4", 5/16", 7/16", 5/8", 7/8", 8mm also Q (5/16" closest imperial drill bit) -Printer (seemed like the right category) -Dremel or Similar Tool (to attach to the finished machine) Hand Tools: -Rubber Mallet (to provide "persuasion" when necessary) -Hex Keys (5/64", 1/16") -Screw Driver -Glue Stick (UHU) or spray adhesive -Adjustable Wrench (or 7/16" socket and ratchet)



step 4: Required Parts

The attached PDF (CNC-Part-Summary.pdf) provides detailed cost and sourcing information for each and every required part. Listed here is only a summary

Sheet Stock --- \$20

- a 48" x 48" piece of 1/2" thick MDF (any 1/2" sheet stock can be used I have plans to make my next version out of UHMW but cost was prohibitive this time around)
- a 5"x5" piece of 3/4" thick MDF (this is used to make spacers so any piece of 3/4" stock found around the shop could be used)

Motors and Controllers ---- \$255

-An entire instructable could be written on choosing a controller and motors. In short what is required is a controller capable of three axes of control (with pulsed step and direction inputs) and motors with about 100 oz/in holding torque. I sourced mine from <http://hobbycnc.com> they have worked well and the kit was quite easy to solder. (direct link)

Hardware--- \$275

-These parts can be acquired from three places. The conventional items can be acquired at Home Depot, the specialty drive products are easy to find at any industrial supplier, I used McMaster Carr (<http://www.mcmaster.com>) (I chose them because they have a nice online store), and finally because of the large number of bearings

<http://www.instructables.com/id/How-to-Make-a-Three-Axis-CNC-Machine-Cheaply-and/>

required I found the best price from an online seller (<http://vxb.com>) which sells 100 for \$40 (leaves quite a few left over for other projects) ([direct link](#))

Software --- (free)

-What is required is a program to draw your designs (I use CorelDraw), and a programme capable of interpreting these files into pulses to be sent to your controller. I'm currently using a trial version of Mach3 (<http://www.machsupport.com>)but have plans to convert to LinuxCNC (An open source machine controller which uses linux) (<http://www.linuxcnc.org>)

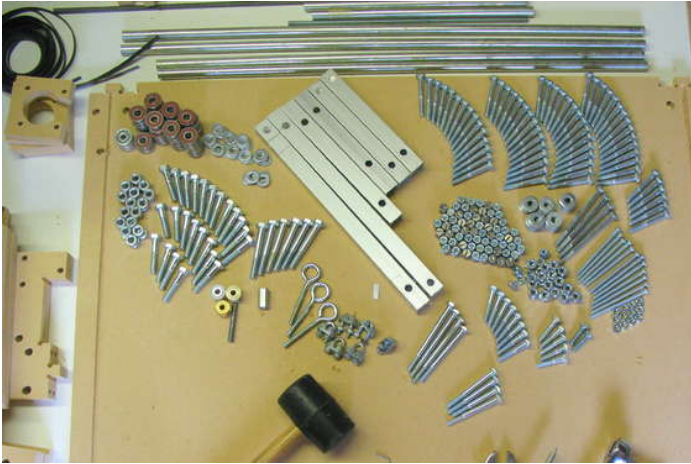
Router Head--- (extra)

-I attached a dremel type cutting tool to my machine however if you are more interested in additive construction (like fab@home or RepRap) you may wish to look into their deposition tools.

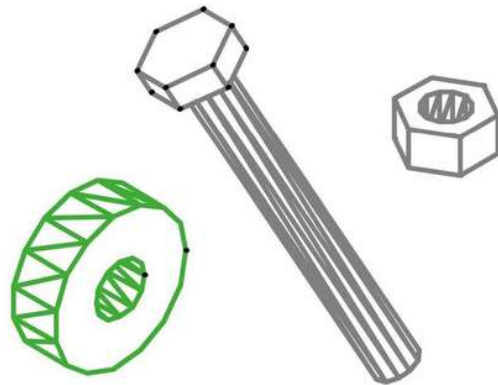
Details

-the metric components and especially the cross nuts aren't very popular and I had to visit several Home Depots in my area before I had enough.

-I couldn't find a way to link to parts directly on the McMaster Carr site. To find them go to www.mcmaster.com and search for the part #



Three Axis CNC Machine Part Summary



Required Parts:

Summary:

Number of Parts: 26
Number of Suppliers: 4
Total Cost: \$551.05

Note: McMaster Carr Industrial Supply website <http://www.mcmaster.com>

Bolt (2" x 0.25")	Required: 76	Cost ea	Total
	Source Home Depot	\$0.24	\$18.24
Bolt (3.5" x 0.25")	Required: 8	Cost ea	Total
	Source Home Depot	\$0.49	\$3.92
Bolt (1.25" x 0.25")	Required: 11	Cost ea	Total
	Source Home Depot	\$0.20	\$2.20

File Downloads

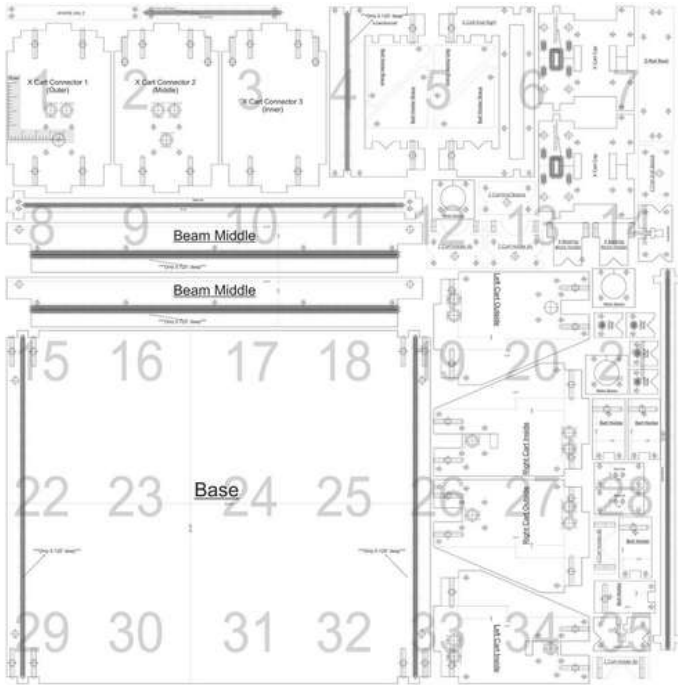


C:\Documents and Settings\Aaron\My Documents\Plotter Stuff\00-Active\Instructable Files\CNC-Part-Summary.pdf (162 KB)

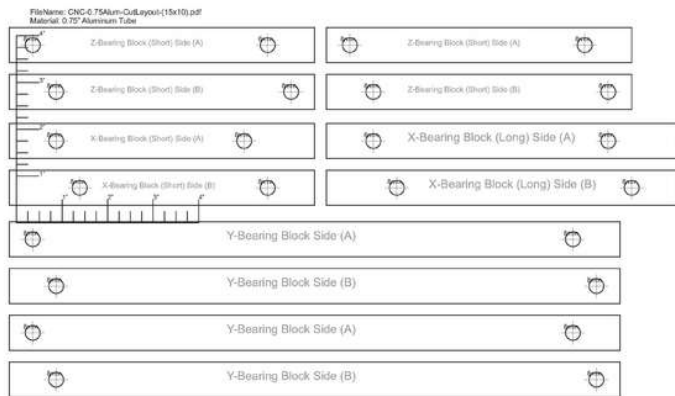
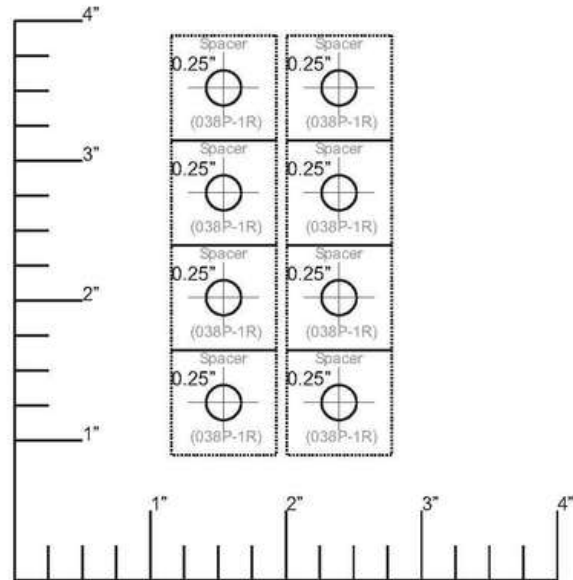
[NOTE: When saving, if you see .tmp as the file ext, rename it to 'C:\Documents and Settings\Aaron\My Documents\Plotter Stuff\00-Active\Instructable Files\CNC-Part-Summary.pdf']

step 5: Printing Pattern

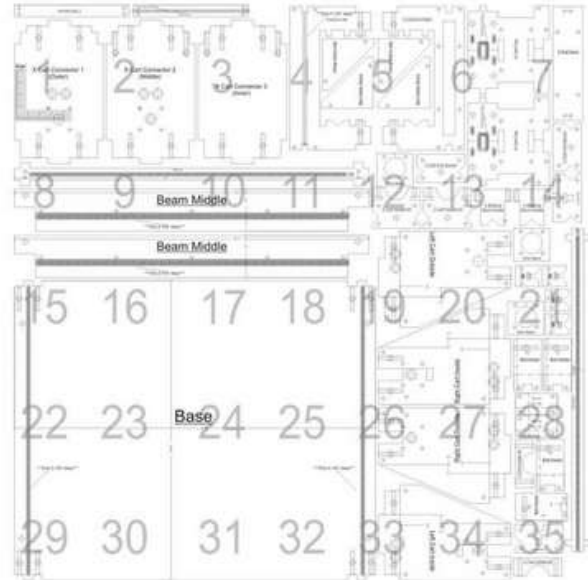
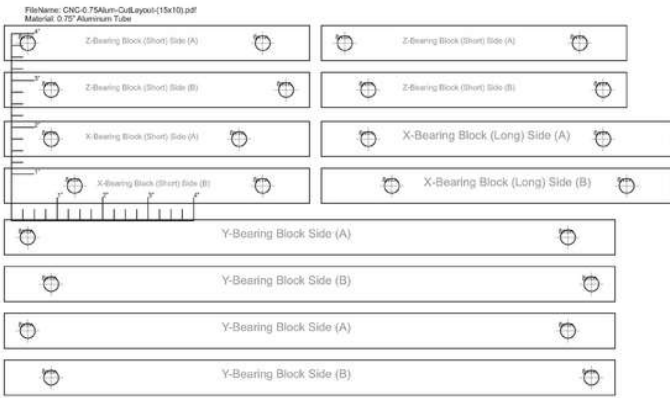
I had some experience Scroll Sawing pieces so I choose to use a glue on pattern method. What is required is to print out the PDF pattern files onto tiled pages, then glue on each pattern, and cutout each piece. File Name and Material: Summary: CNC-Cut-Summary.pdf 0.5" MDF (35 8.5"x11" tiled pages): CNC-0.5MDF-CutLayout-(Rev3).pdf 0.75" MDF: CNC-0.75MDF-CutLayout-(Rev2).pdf 0.75" Aluminum Tube: CNC-0.75Alum-CutLayout-(Rev3).pdf 0.5" MDF (1 48"x48" page): CNC-(One 48x48 Page) 05-MDF-CutPattern.pdf (note: I've added a DXF version of the 0.5" MDF pattern to this step (DXF-05-MDF-SimpleDXF.dxf) I have removed the cross drilled holes and writing from this file to make it a manageable size, if anyone would like any of the drawings in a different format or including different information please just drop me a line and I'll do what I can) (note: I've included the original CorelDraw format drawings in a zip file (CNC-CorelDrawFormat-CutPatterns(Rev2).zip) for anyone who wishes to do some editing) (UPDATE: There is now a choice in patterns for the 0.5" MDF layer, you can download one file (CNC-0.5MDF-CutLayout-(Rev3).pdf) with 35 8.5"x11" pages tiled, or you can download one file (CNC-(One 48x48 Page) 05-MDF-CutPattern.pdf) which has the entire layout on one 48"x48" page to print on a large format printer or tile yourself) (Step by step) 1.Download the three layout pdf files 2.Open each in Adobe Reader 3.Goto the Print Dialog 4.(IMPORTANT) in the page scaling dialog select "none" 5.Check to make sure the file didn't accidentally get scaled to do this measure the printed ruler on page one of each pattern (make sure it matches up with a ruler you trust) (I didn't do this the first time and accidentally printed out a copy at 90% size more on this later)



FileName: CNC-0.75MDF-CutLayout-(8x10).pdf
Material: 0.75" thick MDF

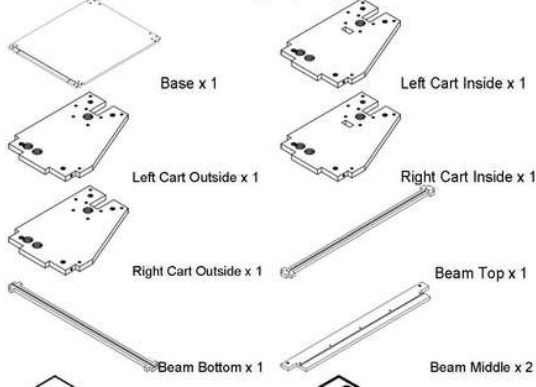


Three Axis CNC Machine Cut Summary



0.5" MDF (Cut from Pattern) (48" x 48")

Cut Pattern PDF: CNC-0.5MDF-CutLayout-(48x48).pdf



File Downloads



C:\Documents and Settings\Aaron\My Documents\Plotter Stuff\00-Active\Instructable Files\CNC-Cut-Summary.pdf (263 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'C:\Documents and Settings\Aaron\My Documents\Plotter Stuff\00-Active\Instructable Files\CNC-Cut-Summary.pdf']



CNC-05-MDF-CutPattern(Rev3).pdf (317 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'CNC-05-MDF-CutPattern(Rev3).pdf']



CNC-075-MDF-(Rev2)CutPatter...pdf (13 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'CNC-075-MDF-(Rev2)CutPatter...pdf']



CNC-075-Aluminum-CutPattern(Rev3).pdf (18 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'CNC-075-Aluminum-CutPattern(Rev3).pdf']



DXF-05-MDF-SimpleDXF.dxf (988 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'DXF-05-MDF-SimpleDXF.dxf']



CNC-CorelDrawFormat-CutPatterns(Rev2).zip (925 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'CNC-CorelDrawFormat-CutPatterns(Rev2).zip']



CNC-(One 48x48 Page) 05-MDF-CutPattern.pdf (72 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'CNC-(One 48x48 Page) 05-MDF-CutPattern.pdf']

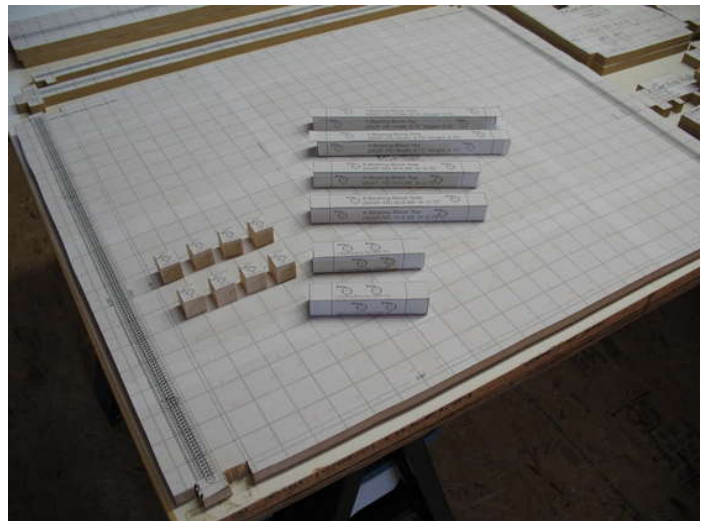
step 6: Gluing Down the Pattern

Next step is to Glue the pattern to the MDF stock and Aluminum Tubing 1.Glue the tiled pages to your sheet stock (MDF) ensuring the edges match up 2.For the aluminum tube the pattern must be glued to two sides. If the Tube is laying flat on a table and you glue the side A patterns to the top side B can be glued on either of the side faces. Tips: -Use lots of glue -Have something near by to help push down each piece -Patience (if anyone else has tips on doing this I would love to hear them)



step 7: Cutout Pieces

Not too much to say for this step simply cut around each outline.



step 8: Cheating

I must apologize at this stage I succumb to the desire to cheat. As mentioned earlier I accidentally printed out my initial pattern at 90% size. Unfortunately I did not realize this until this stage. So left with a 90% scale set of pieces and having moved across country I was now within reach of a full size CNC router table. I gave in and cut my pieces using this machine. However it was unable to do the drilling of holes so back to the real steps (this is why all the pieces from here on out do not have paper patterns glued on them)

step 9: Hole Drilling

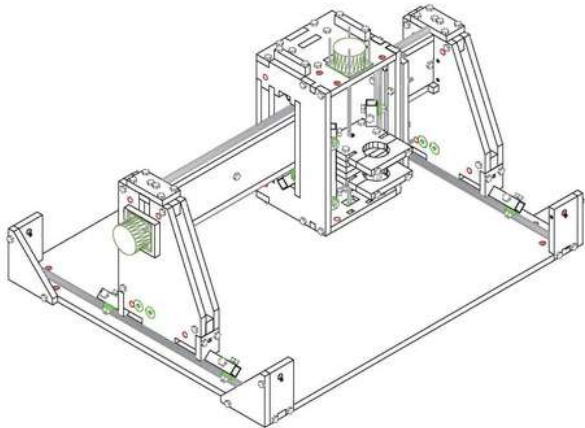
I have not counted but this project requires a lot of holes. The holes which are drilled into the edge of the material are particularly important so just take your time, you'll appreciate it later when you need to use the rubber mallet only sparingly. The areas with holes drilled overlapping are an attempt to create grooves if you have a table router that would work much better for this.



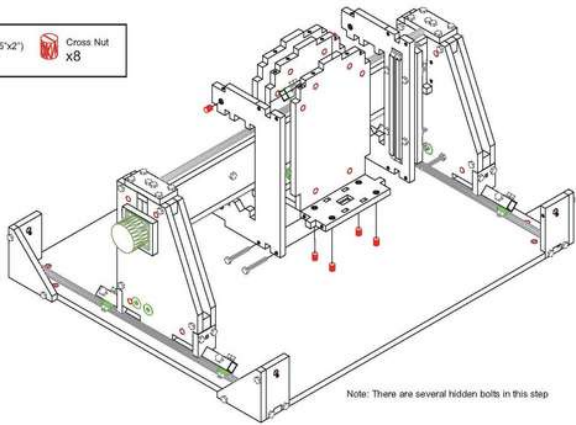
step 10: Assembling

If you've made it this far I must offer my congratulations and suggest it only gets better from here. Looking at the pile of pieces picturing how it manages to become a machine may be a tad abstract so I tried my best to create instructions as close to those produced by LEGO. (downloadable in the attached pdf CNC-Assembly-Instructions.pdf). But in the interest of amusing along the way here is a timelapse of me putting my machine together.

Three Axis CNC Machine Assembly Instructions



16.  Belt (0.25"x2") x6  Cross Nut x8



Note: There are several hidden bolts in this step

File Downloads



C:\Documents and Settings\Aaron\My Documents\Plotter Stuff\00-Active\Instructable Files\CNC-Assembly-Instructions.pdf (786 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'C:\Documents and Settings\Aaron\My Documents\Plotter Stuff\00-Active\Instructable Files\CNC-Assembly-Instructions.pdf']

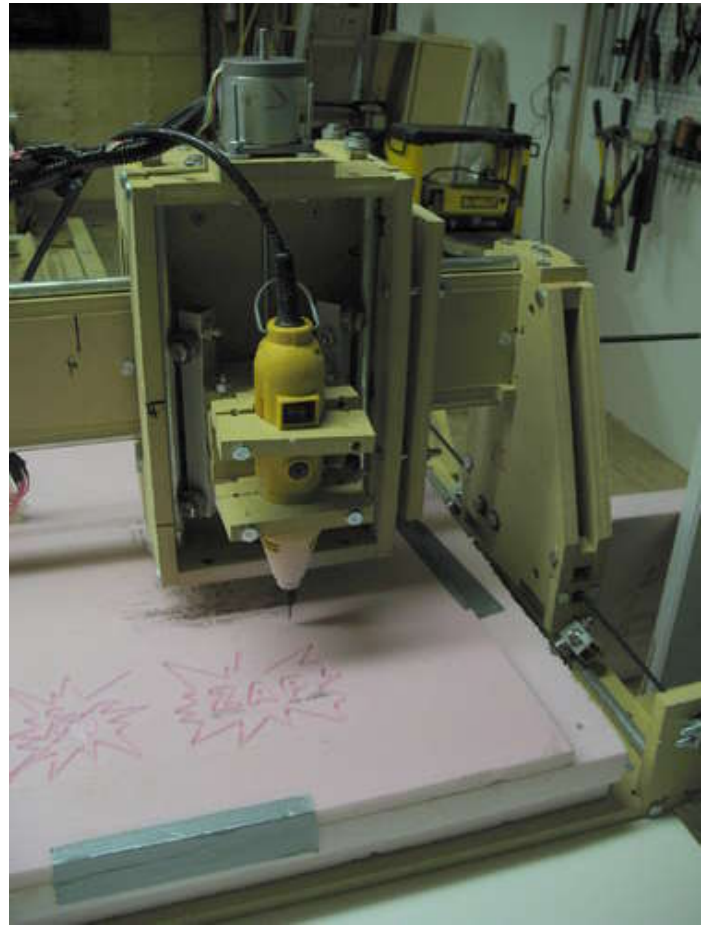
step 11: Software, Wiring and Configuring

Almost there. All that is required is to wire up your motors and controller following their instructions, and to set up your control software using the included instructions and the machine specific details included here in step 2.



step 12: Finished

There you have it hopefully you are finished and ready to go into production. I hope I have not left out any crucial details but if you think of something you'd like to know which I have omitted please just ask. Finally to demonstrate that it all works a video of my machine cutting out a pattern in pink foam.



Related Instructables



3 Axis CNC Router - 60"x60"x5" - JunkBot by russaanderson



CNC (guide) by noahw



Open Manufacturing - (How to Build 30 (SERB) Kits) by oomlout



Make a CNC Hot Wire Foam Cutter from parts available at your local hardware store by tbarnea



Homebrew Laser Cutter made by Zach Radding by TimAnderson



Automatic Wire Cutter and Stripper (video) by oomlout



Laser Hair regrowth by Gamer6460



A Little Switch and Potentiometer Box for Your Arduino by oomlout

Comments

[50 comments](#) [Add Comment](#)

[view all 445 comments](#)



AlexPCS says:

Hi.
I have a little doubt about the project .. on the y-axis and the z's all okay .. the problem is. what makes the X-axis how is the system
if can someone help me may email is bammammij@hotmail.com

Sep 29, 2009. 6:42 AM [REPLY](#)



derekhunter says:

Hey Great instructable!! if i were to build this item am i amble to just add longer metal bar to give the base a longer length?

Sep 14, 2009. 4:53 PM [REPLY](#)



Torito says:

Are the y axis rails round or square? I couldn't find that out...

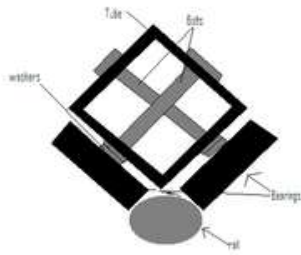
Nov 4, 2008. 11:41 AM [REPLY](#)



galaxyman7 says:

They are round. The only parts that needs square tubing are the "bearing blocks". These are what will have bearings attached to them so that they can slide along the rails.

Nov 5, 2008. 9:22 AM [REPLY](#)



tekenika says:

ref:How to Make a Three Axis CNC...

Hi

I want to make this machine.

I saw your post in youtube.

I need some help.

I have a question.

What keeps the machine on the track? (Y axis)

Only the belt?

I, like you, prefer to use threaded rods.

Do you have a drawing of the modification?

Thanks and best regards from now

Hector

Ushuaia

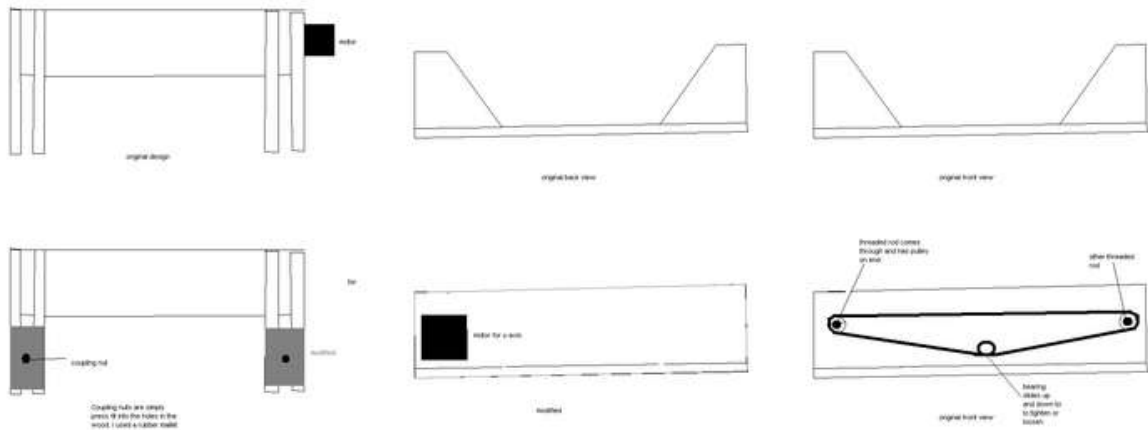
Sep 3, 2009. 9:28 AM [REPLY](#)



galaxyman7 says:

Ok, here is a few pictures.

Sep 3, 2009. 10:53 PM [REPLY](#)



tekenika says:

Thank you very much

The diagrams are simple and clear.

I follow with my questions.

That keeps the machine on the rails?

The threaded rods?

Greetings

Sep 4, 2009. 2:29 PM [REPLY](#)



galaxyman7 says:

Yes, the threaded rod keeps it on the rails. I recommend using a thicker threaded rod so that there is very little movement. 3/4" would be perfect. You can get a PVC pipe coupler from 1/4" to 3/4", then you can drill holes into the side and put set screws through to hold the threaded rod to the motor shaft. Here is a website for an adapter.

<http://www.gtghydroponics.com/store/0-0-715.htm>

Sep 4, 2009. 11:44 PM [REPLY](#)



tekenika says:

Hello

Thank you very much for your attention.

I agree. The threaded rod should be thicker. My problem is I'm planning a mini-mini version of this machine, using printer motors, it is possible that 3 / 4

is too much for these little motor.

A possible solution could be carriers for bearings rotate 90 degrees. I should change the table a bit.

Greetings

Hector

Sep 5, 2009. 9:14 AM **REPLY**



galaxyman7 says:

Another way would be to add a separate rod that the cart can slide on instead of relying on the strength of the threaded rod.

Sep 5, 2009. 11:56 AM **REPLY**



tekenika says:

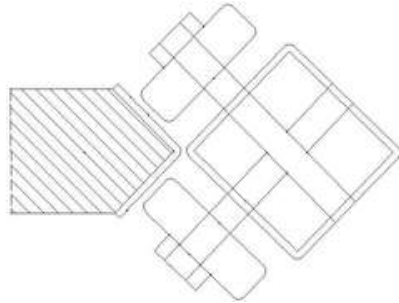
OK. It could be a solution.

It will take a bronze bushing or bearing. Another possibility I've seen is to use an angle as rail.

Deputy quick scheme.

Greetings

Sep 5, 2009. 6:40 PM **REPLY**



galaxyman7 says:

The angle with the two bearings works only if you have a method to tighten them onto the rail. This means you either have two on either side of a track that can be tightened inward, or you have a track on both the right and the left, where the distance between the tracks can be extended. The best is a combination with both. Here is a pic

Sep 8, 2009. 9:12 PM **REPLY**



tekenika says:

We agree. For simplicity, I only showed one side. So the vertical line is dotted. In a small machine, the table itself could be angled to accommodate the aluminum angles.

best regards

Sep 9, 2009. 2:41 PM **REPLY**



galaxyman7 says:

Here is a metal one

<http://www.hardwareandtools.com/invt/u720526>

Sep 4, 2009. 11:45 PM **REPLY**



Torito says:

Thanks GalaxMan7!! I understood the bearings system, kind of autocenter rail and hard to move perpendicular to the rail. Excellent drawing! :) Do you have/know/test the diameter of the rail? What is the material of the bearing blocks, aluminium or wood? Thanks for your time.

Nov 5, 2008. 2:13 PM **REPLY**



galaxyman7 says:

The diameter of the rod is .5" DIA (aluminum). The square tube is .75" square (also aluminum). The bearings are 8 mm ID and 22 mm OD. Also, I forgot to draw the nuts on the end of the bearings that keep them on. I hope that answers your questions ;)

Nov 8, 2008. 9:57 PM **REPLY**



Torito says:
Excellent, more than I expected. Thanks.

Nov 10, 2008. 2:43 AM [REPLY](#)



standupclothing says:
Anyone have some advice where you can input the resolution for each axis in Mach3? Just like the values in step 2.

Sep 4, 2009. 4:48 PM [REPLY](#)

That would be awesome!
Thanks!



Angry_Monk says:
I started to build this over the summer. i had the parts laser cut at my college from the DXF file. i just completed it a week ago after modifying it for better precision on the X and Y axes. i replaced the belt drives with threaded rod so now i can step forward 0.001" no problem, i think i can even do 0.0005" fine.

Jan 11, 2008. 11:01 AM [REPLY](#)

modifying the X and Y axes for threaded rod control isn't that bad, the only hard parts were making the new motor mounts and controlling both sides of the Y axis with one stepper. i ended up controlling both the Y axis threaded rods (one on each side) by mounting the timing belt pulleys on the ends of the threaded rod and running a timing belt around the rods on the back of the machine.

the reason for all this is because i want to do very small precise machining. i already have milled a couple propeller molds, to lay carbon fiber over, that are 1" in diameter and need 6000 lines of G-code to mill. i actually have another being milled right now. they came over very nicely.

i have a video of my machine in action but its hard to see any details of the prop because of its size and because my camera won't auto focus during a video.
http://www.youtube.com/watch?v=_rdFn6b7b6o



tekenika says:
Hi
I, like you, prefer to use threaded rods.
Do you have a drawing of the modification?
Thanks and best regards from now
Hector
Ushuaia

Sep 3, 2009. 9:55 AM [REPLY](#)



wizardrule says:
Got the dxf file around you can post?

Oct 4, 2008. 1:57 AM [REPLY](#)



Angry_Monk says:
He has the DXF for the parts under step 4.

Oct 4, 2008. 9:13 AM [REPLY](#)



kardinal7 says:
Hello,
I'm building one right now. The purpose of the machine is to mill PCB's i need the machine accurate to 0,001 . *Did you try the machine with the standard building? How accurate it worked? Can you put images of the changes you have done?*

Jan 13, 2008. 5:07 AM [REPLY](#)



Angry_Monk says:
yes, i tried the machine with the standard planes. the Z axis is fine at 0.001" res, probably more. the X and Y belt driven axes were only good for about 0.002" res. note my micro stepping was at 1/4. i didn't want to increase micro stepping because that is more of a software way of increasing resolution, i want to increase resolution the hardware way so i know i'm really getting what i want.

Jan 13, 2008. 8:51 AM [REPLY](#)

when i switched to threaded rods i did get a slower traverse speed on those axes but increased accuracy. i also needed a larger stepper for my Y axis because it was driving two threaded rods as opposed to one. a final note is that i used (2) screw in T-nuts to attach each threaded rod to the machine (and ball bearing at the ends for support and to reduce friction). the purpose of two T-nuts is so that they can both be attached to the machine but tightened against each other a little to help reduce backlash. this creates more friction on those axes but it greatly reduces backlash to near nothing.

for this mod i just got a 205oz-in stepper from HobbyCNC, and a 77" timing belt (same type as the kind used here) from mastercarr. everything else: timing pulleys, 1/4" bearings, 8mm bearings etc.. i reused. i used the 8mm bearings to fashion some extra pulleys on the back side of the machine for the 77" timing belt.





epo says:
Hi!

May 26, 2008. 7:29 AM [REPLY](#)

Thanks for showing the details on the modifications you made of Stuart's instructable. I can see in your other image posted under "others who have finished" that you are using a rigid laminate trimmer which have a variable speed feature.

Let me pick on your brain and experience if you don't mind :)

- How fast do you run the router?
- where do you get your router or end mill bit?
- what is the maximum depth of cut per pass do you subject your cnc?
- Stuart indicated a feed rate of 60 ipm, do you have the same or you have another preference?
- Have you used your cnc to cut mdf?

I know that's a LOT of questions but will appreciate your insights.

Thanks.

Edgar



Angry_Monk says:

May 26, 2008. 9:04 AM [REPLY](#)

its really not a lot of questions. sometimes you just have to ask, and i can answer.

i run the router at close to max speed, i dont know the RPMs. i figure this CNC isn't exactly the most rigid one out there and if you cut at a decent speed things will flex a little, and i needed it to be very precise. so the higher the RPMs the less stress on the bit and such.

you can get the cutting bits from Master Carr (they basically have close to everything, so if you ever need anything check there).

for depth of cut.. again, i needed precision, so if you can sacrifice this you could cut lower. but i usually didn't go more than 1/8" deep per pass, and that would be a heavy cut rough pass.

i think it got it to run good at 30-40 ipm, 60 is a little fast for the small parts i was cutting. when cutting i would go down to 3ipm.

i haven't actually used the machine to cut MDF but i think it would do fine cutting it. i don't know how fast you would be able to go but you could cut it.

a few things worth noting about this:

when you pick a motor for this CNC make sure it has collets for 1/4" and 1/8" tools. its a pain if it doesn't... but if you run into that (like i did) you can actually get a collet adapter from Drill Bit City.com.

one major thing i noticed about this CNC was that although the I-Beam for the X axis traverse was strong in the Z direction (could take some weight) the carriage could rotate about the I-Beam (rotate about the X axis). this would make the carriage flex in a hard cut. if i were to redo these plans i would definitely do something to fix this. maybe add another I-beam about 4-6" away from the existing one to get more rotary support.

i have to admit that after i built this it couldn't cut as precisely as i needed it to so i ended up buying a desktop CNC mill from Taig. since i already had the steppers and controller board from this i could buy the CNC ready version. but i do not regret building this, i will still keep using it as a CNC Router. it was great to build, it taught me a lot about CNC in general being that this was my first experience with it. but for those who just want to cut about good parts CNC style, then this works fine, plus its cutting area is huge (and easily scaled up.).



epo says:
Hi!

May 26, 2008. 4:41 PM [REPLY](#)

Thanks for spending time to answer my query :) and your insights will prove to be very useful as I optimize the performance of my cnc. Fastest rpm assuming that you had what I have (i.e., rigid laminate trimmer) should be 35000. Currently I'm running g code with feed rate of 12ipm and wow you did ramp it up almost 3x. That will save me time! But then the issue of precision is the downside. I did anticipate using 1/8 bits so got an adapter to fit into the 1/4 spec of the trimmer. I have no problem visualizing flexing problems you experienced. Like you, this is my first cnc encounter and the experience will probably serve me well in the future.

Out of curiosity, where did you purchase your taig unit and for how much?

Regards.



Angry_Monk says:

May 26, 2008. 7:48 PM [REPLY](#)

i got the taig mill from <http://cartertools.com/>, the guy that runs the site is really nice and helpful. i got the CNC ready version and that was about 1100\$. i really like it, its very nice and precise.

just an FYI, i could run this CNC router at 30-40 ipm but that was only rapid traverse. when cutting i went much slower. and even on 30-40ipm you can miss steps, 12ipm is better, but i would only go up to 20.



epo says:
thanks

May 26, 2008. 11:17 PM [REPLY](#)



oomlout says:

Apr 6, 2008. 7:58 PM [REPLY](#)

Wow, not sure I ever thought anyone would actually complete the build but your machine looks awesome (sorry grew up on ninja turtles).

Would you maybe have a photo which includes the full machine I would love to add on another step to the Instructable showing other peoples versions. (could you send it to me in a private message along with any relevant info you'd like included about your machine (of course only if you'd like it to be there)

Also very impressed with your conversion to threaded rod, there are a lot of applications where the toothed belt just isn't precise enough.



Dodgy says:

Nov 2, 2008. 3:11 AM [REPLY](#)

In addition to my previous question, re rod vs belt drive, how does the tightly strung inox (stainless steel) wire compare?

If I can get inox rod at a reasonable price, would that be the best thing to use? If I chose rod.

I would like the highest amount of resolution I can get.

I know that the finer the pitch of the thread is, the more resolution it will have, but what about the width of the rod? I thought originally that a thicker (M12) rod will be better, then I realised it would be heavier and harder for the motor to turn, and perhaps, give no resolution advantage, and perhaps, thinner is better!
What's the deal?
Thanks.



Angry_Monk says:

Nov 2, 2008. 8:11 AM [REPLY](#)

the pitch of the threaded rod is really what is important. you just end up creating a worm gear drive. for greater resolution use finer threads, it will amount to a higher gear reduction. its all about the gear ratio. the greater the number of turns the motor has to turn to get the machine to move a distance X the higher your resolution and also the greater torque the machine has (added bonus). you can get the same gear reduction using a belt system but you you will just need to gear the motor down before it drives the belt, which is a lot harder than just using threaded rod.



AnimattersInc says:

Sep 22, 2007. 11:50 AM [REPLY](#)

Hey all, I'm about to embark on this project and thought I'd share a tidbit with you. There's a large format print shop in my city that can actually print the plans right onto the MDF and the result is nice and sharp (thanks to the smooth, hard surface of the MDF). They're printing it for me for just over \$5 a square foot (just under \$100 total). Thought I'd pass this along as there may be similar shops in your areas that can do the same.
KD



oomlout says:

Nov 1, 2007. 9:29 AM [REPLY](#)

Hey:

Thanks for the tip it sounds like a great one and would certainly help greatly in precision. Would love to hear how your build is going.

Regards
Stuart.

P.S. I am working on coming up with a way to produce the cut MDF pieces for purchase, but haven't quite cracked an ability to provide the volumes I'd like to produce (small) for a price point which I feel would provide good value (again small).



AnimattersInc says:

Aug 12, 2009. 12:18 AM [REPLY](#)

Hey Stuart, not sure if you're still keeping an eye on these or not but I thought I'd let you know that the build, which got shelved for one reason or another is officially underway. I start my cuts tomorrow and will hit the Home Depot's nuts & bolts aisle for all the other goodies. I've started building water wheels with bells & whistles (so to speak) and it requires a pile of little gears and cogs. 30 minutes on my scroll saw and it occurred to me that this might be a great time to build this CNC machine. Thanks once again for being such a great resource. This machine should allow me to focus on the creative side of things as opposed to logging hours on a scroll saw.



AnimattersInc says:

Aug 18, 2009. 11:14 PM [REPLY](#)

Thought I'd post a week one update. I've got all the cuts made, holes drilled and routed bits routed. This is working every other evening for about 4 hours? Maybe longer on Saturday last weekend.

Had trouble finding the cross nuts in the quantity required at the local DIY centre but after visiting a few of them found enough. Ikea has tons of them and only 10¢ each but they are fine metric thread so you'd have to shrink the .25" holes a touch. Otherwise they'd work just fine and way cheaper (69¢ at the DIY).

Assembly should begin this weekend!



AnimattersInc says:

Aug 29, 2009. 11:49 PM [REPLY](#)

Just another update for you all. Things are coming together but I've found out that you really should have the stepper motors and bearings on hand before you begin assembly because it's no time at all before you need them. I'm now online placing that order right now.

One thing that would have helped me is to really visualize and understand the shapes of the pieces and how they fit together. I didn't realize that the little channels and stuff were to accept a joint with another 1/2" section of MDF. That said, some of the cutouts are not as smooth as I would have made them and/or I stayed on the wrong side of the line when cutting. The "persuader" helps in this matter.



arduinoe says:

May 10, 2009. 1:31 PM [REPLY](#)

wow...



borsodas says:

Aug 10, 2009. 7:23 AM [REPLY](#)

what do you think of by DIY CNC site, be honest. thanks yall.



slider388 says:

Aug 21, 2009. 6:21 PM [REPLY](#)

The design and layout isn't that great, I guess its more of a blog, but the information is very well written and awesome really informative stuff, the links and all are great too.



evox says:

Aug 11, 2009. 6:03 PM [REPLY](#)

I was wondering if anyone could help me out. i have a friend that is a machinist and she was wondering if anyone had the code to cut the pieces out or has anyone made the measurements. this would save me a huge amount of time. so if someone could help me out i would really appreciate it. thanks



nick2334 says:

Aug 9, 2009. 9:18 PM [REPLY](#)

I have a question about the motor couplers. From what I can gather, they are just bored through 1/4" holes with two set screws to secure the shafts. On the X and Y axis there is a smooth 1/4" rod which will slide into the couple nicely. For the Z axis though, it is a threaded rod going into the couple. Is the OD of the threaded rod exactly 1/4" and does it slide in easily and concentric to the motor shaft?



vanmik says:

Aug 4, 2009. 6:35 AM [REPLY](#)

super netto pdf



Sanger35 says:

Aug 2, 2009. 9:14 AM [REPLY](#)

Hi; Just starting on my CNC and look forward to looking over your site. I also purchased the spacers for the roller blade bearings, then cut each one in half to make two pieces. The bearings will ride on the spacers and a 1/4" bolt attaches them to stock.



outland86 says:

Jan 16, 2009. 10:04 AM [REPLY](#)

Jan 16, 2009. 10:00 AM outland86says:

Hi all Just thought i would update the offer for kits with a photo of the parts you get remember its all the hardware only thing you have to supply is the stepper motors and the driver electronics and of course a computer...i can help with support for assembly and what software etc you will need to get up and running only 14 kits left and i am sorry but i will not be making anymore...\$560 includes shipping to the lower 48 states. these are sold at cost as a courtesy to those who want to make this machine but do not have time or tools to make from scratch. call me 320 469 0347 in minnesota and i can setup a paypal invoice to you or arrange payment or you can just send the money to me by Paypal paul@thelostradio.com and i will ship it right out dont forget to look at my other post here for more details. as i said i am now offering some telephone and email support to help you get your machine up and running. see picture below



kgdesigns says:

Hi, do you have anymore of these kits available?

Jul 31, 2009. 3:46 PM [REPLY](#)



outland86 says:

hello yes i do have a couple left we can also now supply stepper motors and MACH 3 software to drive the machine

Jul 31, 2009. 4:08 PM [REPLY](#)



hypercube33 says:

What if I live in or near minnesota?

Jul 16, 2009. 8:53 AM [REPLY](#)



outland86 says:

Hi,

You can save on shipping if you pick it up. It would be \$500 and If you would

like to purchase the stepper motors from me that would be an extra \$100 so \$600 for the kit including stepper motors if you were to pick it up. Thanks

Jul 16, 2009. 9:55 AM [REPLY](#)



epo says:

Hi!

I know its been a long way since January but have to ask anyway. Do you still have the kits available?

Thanks.

Jun 21, 2009. 4:37 PM [REPLY](#)

[view all 445 comments](#)