Build a Foamcore CNC Machine

by imoyer on March 20, 2011

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Intro: Build a Foamcore CNC Machine

Build a low-cost CNC machine in your kitchen, for under $120, using tools obtainable at your local art and hardware stores.

The goal of this project is to explore the bottom end of CNC machine construction. It utilizes foamcore - an easy to work with and cheap material - for its structural components. This constraint has led to mechanisms which are different than on most CNC machines. More general information on the project can be found here:

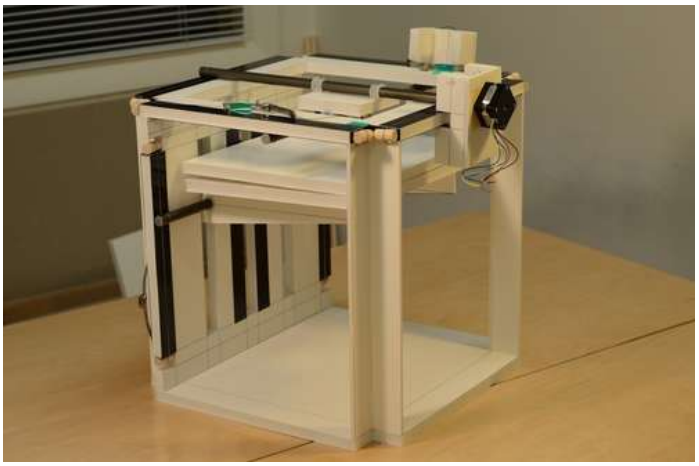
http://web.mit.edu/imoyer/www/portfolio/foamcore/index.html

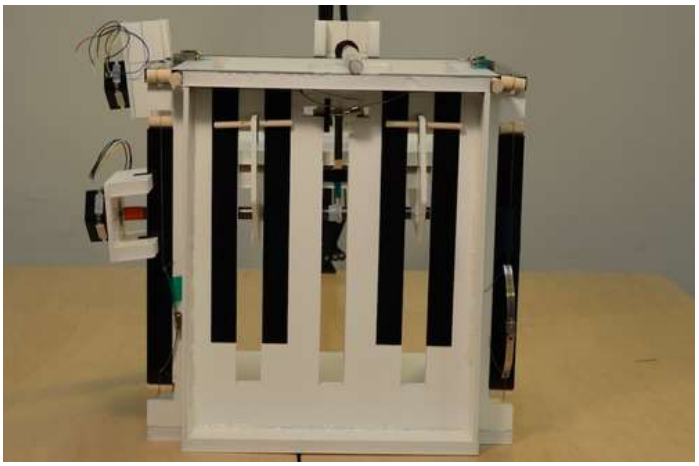
The machine shown at this link, as well as in the video below, is an older version to which some changes have been made.

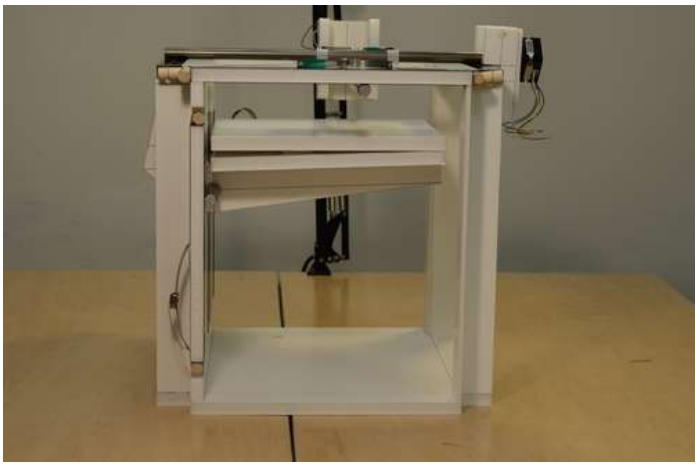
Hopefully this will be an ongoing project as I develop a controller suitably under-engineered to match this machine.

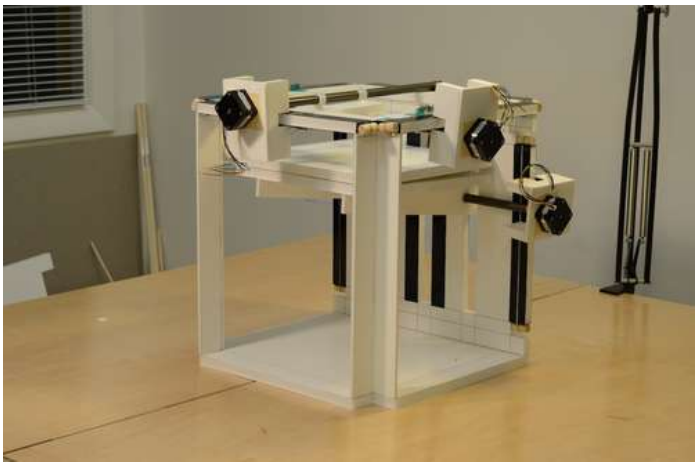
Foamcore CNC from Ilan Moyer on Vimeo.

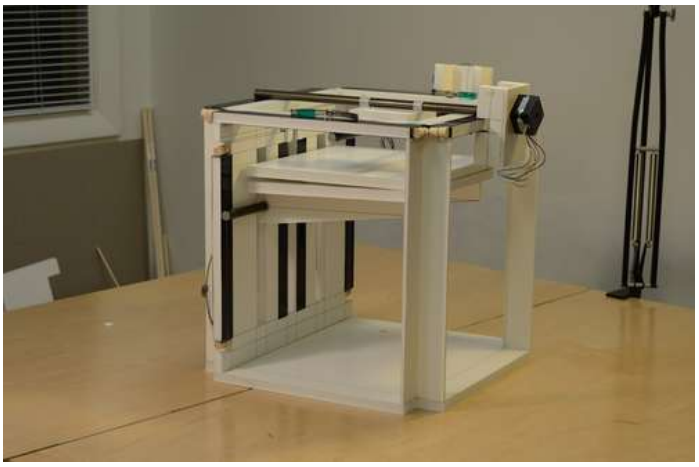
This Instructable only covers the construction of the physical machine, and does not go into the electronics necessary to control it. There has been a lot of work done on developing DIY stepper motor controllers, and the motors chosen for this project should be compatible with almost any driver out there.

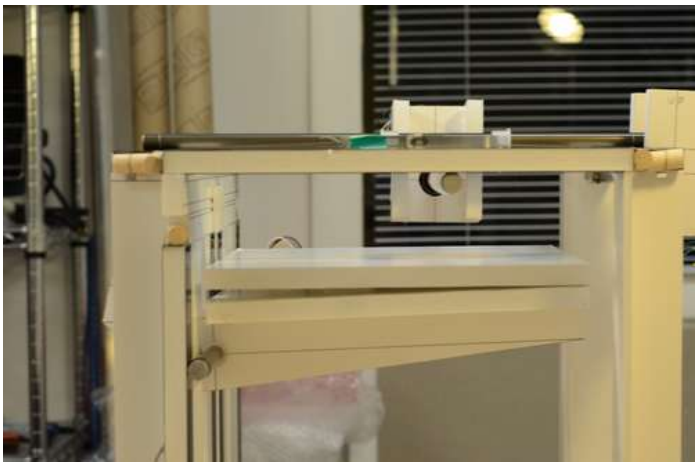






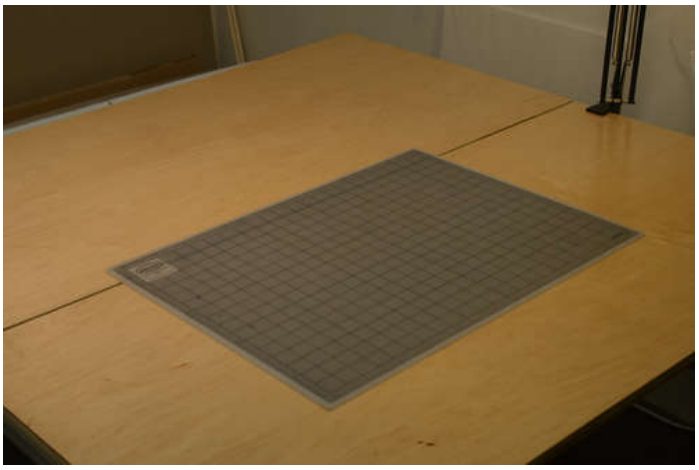


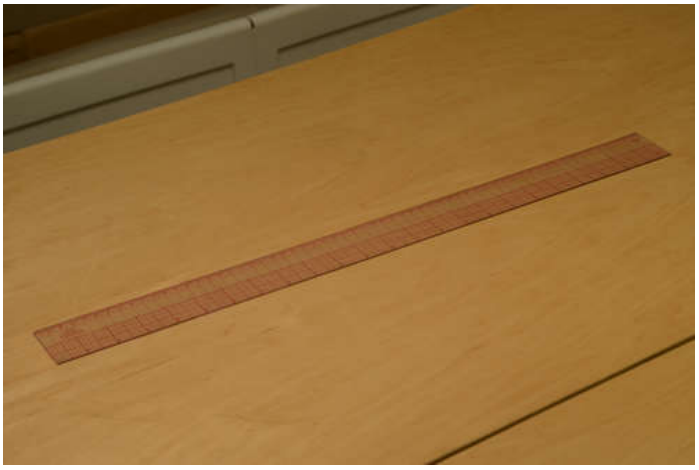




Step 1: Gather Your Tools

A visual glossary of tools necessary to build the Foamcore CNC is attached to this step as a PDF.





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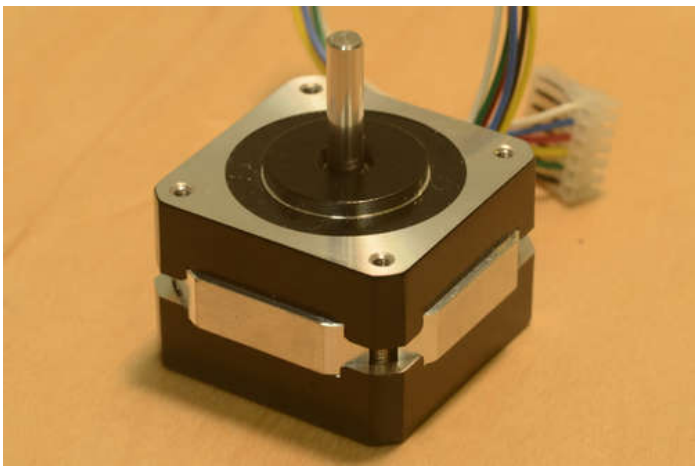
P1_VisualTools.pdf (4 MB)
[NOTE: When saving, if you see .tmp as the file ext, rename it to 'P1_VisualTools.pdf']

Step 2: Gather Your Materials

A visual bill of materials necessary to build the Foamcore CNC is attached to this step as a PDF. Also a sample McMaster-Carr order is attached to provide better details for the parts.

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P2_VisualBOM.pdf (4 MB)
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McMasterBOM.pdf (66 KB)
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Step 3: Lay Out the Top Plate

You will need:
- 1/2" Foamcore
- Sharpie or Pencil
- C-Thru Ruler

The top plate is the key structural component of the Foamcore CNC's XY stage. By the end of this step, you will have the top plate marked and ready to cut.

Please refer to the attached PDF cut pattern while doing this step.

This step will guide you through marking the 1/2" foamcore according to the cut pattern.

Technique 1: Marking a Square.

1) Mark along the lower edge of the foamcore at 14-1/2".
2) Similarly mark along the left edge of the foamcore at 14-1/2".
3) Align the ruler perpendicular to the left edge of the board at the vertical mark which you just created. Now mark 14-12" out into the center of the board. Just create a tick, don't draw a line yet. We are preparing to draw our first vertical line.
4) Now run the ruler from the tick created in sub-step 1 with the tick which you just created. Draw a vertical line connecting the two ticks.
5) Just to be sure, mark along the new vertical line at 14-1/2."
6) Now connect the tick in sub-step 2 with the most recent tick with a horizontal line.

You have just drawn a 14-12" square! The reason it's so many steps is to ensure that it ends up actually square and not skewed.

Technique 2: Drawing Construction Lines.

All of the dimensions in the cut pattern are what are called "ordinate" dimensions meaning that they are all relative to a common zero point. Use these dimensions to first mark ticks along the perimeter of the square. For each dimension you should mark ticks on opposite sides. This will make the lines you draw perpendicular to the edges of the square.

When you are finished, your layout should look like the second and last pictures in this step.

You will use these technique throughout this instructable.