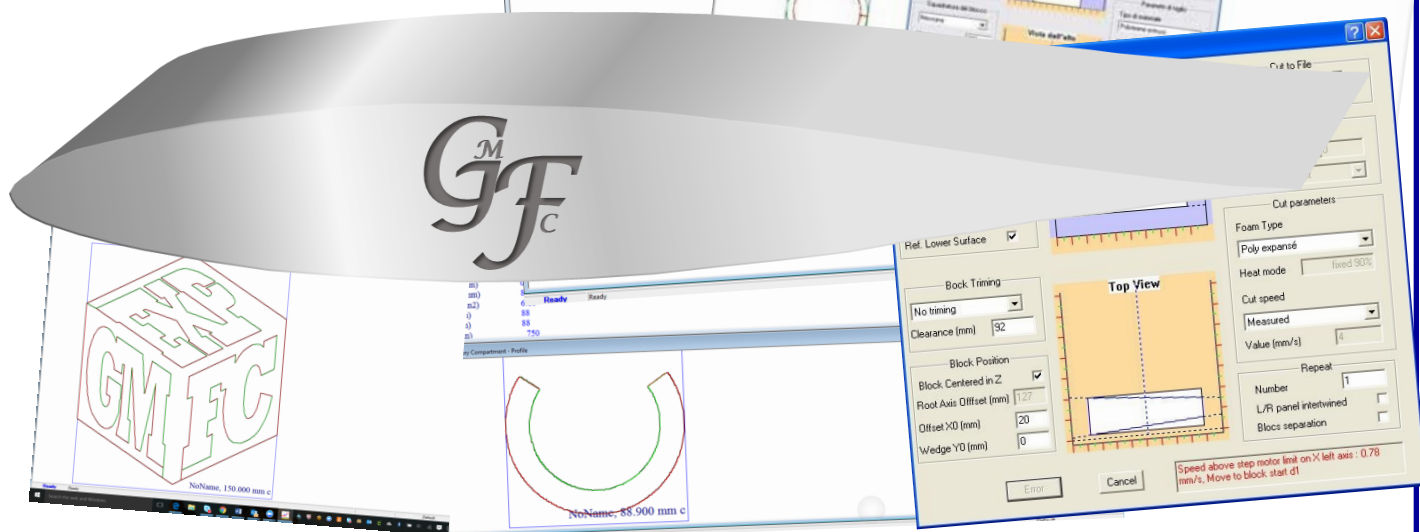


GMFC

Gilles Muller Foam Cutting



July 2018—A moment with Gilles

It's been a busy year, lots of new challenges, lots of new ideas, and lots of new developments—unfortunately lots of work, resulting in limited time to concentrate on the important things in life, “play” the things that make us happiest.

I have been working on a new GGC which is still very much hush-hush, but it is now in beta testing in a couple of locations—sorry but more cannot be said until I am ready to launch, but it will provide some significant improvements over the current GGC2. Some of the new capabilities that will be made available in GGCv3 have taken a while to perfect, but I believe once it is launched will offer some significant enhancements.

I have also built a brand new foam cutter, the bed is made exclusively from extruded aluminium, and the rest has been made from parts which are mostly available in ones local hardware stores. It's now completed, and working well. Please visit my blog for more information.
<http://blog.gmfcsoft.com>

This last year has also been a busy year for travel. I am currently on business in the US, but will return home soon.

I wanted to take this opportunity to thank those loyal people who have bought and are using my hardware and software, those who have contributed to its development and testing, and those who provide feedback—it's through feedback that I can continue to enhance the software and hardware, in line with your expectations.

Yours Gilles.



Editors Comments

Hello GMFC aficionado's.

When I put the first Newsletter together I sincerely thought that I would be able to get a newsletter out every month or two. Unfortunately life took over. I moved house which turned out needed significant work, I changed job which required rather frequent travel, and just when all that was coming to an end, I then needed a bit of back surgery, probably not helped by the heavy lifting getting the house straightened out. Apparently life likes to tell us in no uncertain terms that each and every year we get older and unfortunately not necessarily wiser.

This edition is going to be exclusively centered on building foam cutters. The e-mails I have received and read on the forums are mostly related to how to start, how difficult they are, what skills are needed and where to get plans etc.

Now I have had a few e-mails asking for information on a few subjects—please forgive the tardy responses you have received—but please also take into account that I have been working 100 hour plus weeks with at least 50% travel.

I promise I will try to be more responsive in future. AND—if you don't get an instant response please feel free to ping me again. With everything going on, it has been difficult to even remember who has and has not been contacted.

Best regards Jorgen



Building a Foam Cutter

Foam cutters can be built to almost any budget. They do not need to be expensive to be good. You do not need degrees in mechanical engineering, electronics engineering or need to be a master metal fabricator or carpenter to deliver a machine which will adequately cut wings to very fine tolerances.

But let's cut through a few myths first.



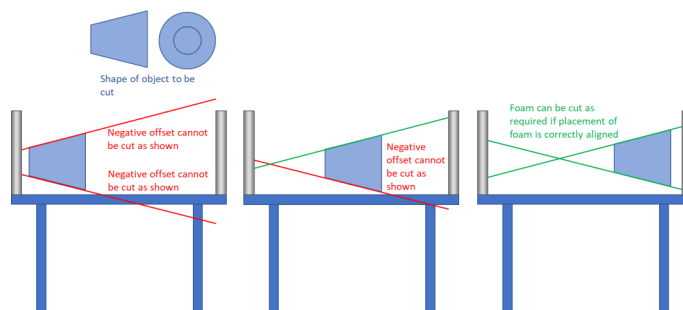
1. Foam cutters do not need to be expensive to build
2. Most foam cutters are pulled together with essentially off-the-shelf parts brought from any hardware store or on-line with Amazon
3. Foam cutters can be built from almost anything, my first one was almost exclusively wood, the designs which will be posted are of my latest which will be built almost exclusively from Aluminum
4. Foam cutters do not need to be big—in fact the longer the wire, the more deflection you will get, and the less accurate the wing.
5. Foam cut wings do not need to be cut to tolerances of $\pm 1/1000$ ". Gentlemen it doesn't matter we are building model airplanes, and even just holding 1Lb foam will distort the top and bottom surfaces by more than that.
6. While the wire type you use is important, you can cut ultra fine wings with almost any wire. I have only tried 2 different wire types—Stainless Steel and, Nicel Chromium (NiChrome). Frankly I have had equal success with both.
7. The longer the distance of the wire the less heat you will get out with the same Voltage/Amperage. Therefore a bow set-up will provide more consistent cuts than a wire which moves/travels/extends. Again, much of this is only really noticeable if you start building big—keep small and I honestly think one would be hard pressed to determine any real difference.
8. If in doubt don't be afraid to ask.

In my view the electronics are the most challenging, but that's probably because I have a background of mechanical engineering, and computer science, and frankly hate soldering, and hate reading through tons of component specs to find that perfect unit to do the job.

Where to Start

First identify what you want it for, to cut wing cores—but foam cutting can do so much more—I know many of you also cut fuselages, I also cut my own fins and stabilizers. The reason this is important is because the design of your machine must be able to accommodate the shape of the foam you want to cut. To give you an example. My first machine had a total travel of about 18" 450mm on the towers—which is way more than enough to cut foam wing cores. However when I started cutting round tapered fuselage parts I quickly ran into limitations, especially when my towers were set 40" apart. The only way of cutting what I needed was to set my foam high up in the middle of the table.

The following diagram gives some consideration to how critical it is to identify where the foam is placed and how



the overall geometry of the machine should be considered. Even a slightly more tapered piece would be impossible to cut with the geometry of this machine.

Think about the space you have available—once constructed these are high precision pieces of equipment, and cannot be easily moved—even a wooden machine will weigh far more than you want to move around.

Now consider bow machines versus machines using an extending wire. Both have advantages and disadvantages. Machines which have an extending wire use and need less space, but can be a little temperamental when it comes to a wire length which is constantly changing, and can result in the slower areas providing overheated foam while the faster areas result in foam which could benefit from a little more current.

A bow machine will provide a constant voltage and amperage across the entire length of the wire all the time, but they do require significantly more space than an extending wire machine.

Also consider how much time and energy you wish to put into your latest creation. This is likely all new to you, you will have to do some research, you will have to acquire new skills, you will have to make new friends who you can call or e-mail and who will give you the best advice that they can—but be aware, I have yet to see any two machines even remotely similar, so the advice you receive will need to be decoded/deciphered to identify what will work for your particular project.

Lastly, Identify your budget and stick to it. As stated earlier it is not necessary to spend a fortune, but you can if you want to.



GMFC Newsletter

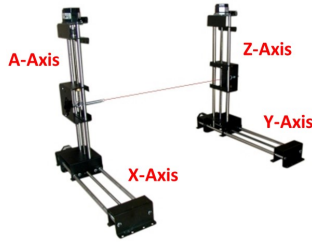
Send your:
[News, Views, Comments, to](#)
GMFCNewsletter@gmail.com

The Basic Components Needed

As stated I have yet to see any two tables which look even remotely similar, however all must have the following common components to be CNC foam cutting machines.

1. Must have 4 movable axis—X, Y, Z and A. In other words, there must be 4 independently movable axis for a foam cutter to function.
2. This requires that you need 4 Stepper motors, my own are Nema23's but they really don't need to be that powerful.
3. You will need 4 sets of rails, I have seen everything used from drawer slides to high quality industrial units—with no discernable difference in cut quality.
4. You will definitely need some type of screw drive to transition rotary movement to lateral movement—one for each motor.
5. You will need a power supply for a heat source—I believe my power supply provides 30V up to 5A—which is more than sufficient—remember you want the wire to get hot not deliver 110V at 11A to shock the bejeezus out of you.
6. You will need a 4 axis Stepper Motor Controller—there are lots of good ones out there, Personally I have a Leadshine MX4660, but there is also the Gecko G540. Based on the forums I have visited I would however stay away from the cheaper Chinese stepper motor controllers, which seem to be a bit hit or miss.
7. You will also need a power supply to drive the controller and stepper motors, which will need to be matched to your own motors. Mine is a 48V 12.5A unit, but there are cheaper and less powerful alternatives. Please be aware some drivers can only accommodate 30V.
8. You will need 4 motor couplers—to attach between the motor and the screw drive spindle—it doesn't matter how good your engineering skills are you will never be 100% aligned—these help take the wobble out of that misalignment. These are cheap as chips, or expensive, I have even seen garden hose used—again—don't knock it—it works.
9. Then there is a plethora of other stuff from screws, to wire, to wire retainers, nuts, bolts, washers, and of course the table itself—but again none of it particularly costly.

A good source of materials is cncrouterparts.com



If you want more information on industrial components including rails and lead screws, feel free to reach out to me. I use Chinese made units which I fully specify, but as we all know there are good and bad components—I now have a couple of manufacturers I use to get the bits I need, at generally a fraction of the cost that industrial units sell for in the states.

Building skills

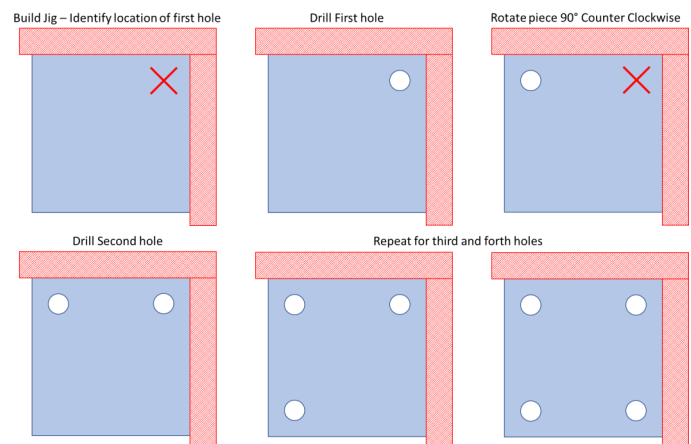
If you are the kind of person who cannot put up a shelf, or when you have, everything indiscriminately slides to one end—then perhaps building a machine is not going to be a painless experience for you. Whether building in wood or metal, you will need certain skills and certain tools, and a healthy dose of ingenuity to overcome those problems which are almost certainly going to plague you at some time or other.

My first machine I build almost entirely from MDF—heavy, and not particularly strong, but more than capable of doing the job this next one is being built almost exclusively from aluminium—aluminum for those of you who speak American. :-) That does require additional skills such as the ability to accurately tap threaded holes.

Also be aware almost everything being ordered from China will be delivered in metric, so if you are ordering lead-screws, rails and/or bearing blocks (pillow blocks) the chances are they will be tapped for 6mm bolts/machine screws.

I believe a drill press is an essential tool for building your next table, and would also go so far to say that you will need to be able to make jigs in order to create perfect replicas. For example if you want to create a mounting for a pillow block and it has 4x6mm holes all exactly 5mm from each corner. Building a jig will enable you to be able to get 1 hole exactly right, then by rotating your material by 90°, get the next hole in also exactly the right position, replicating this 2 more times provides a perfect pillow block mounting bracket.

The following diagram provides a simplistic but effective way of making and then using a very simple jig. A skill which I believe is essential if you want to build your own machine

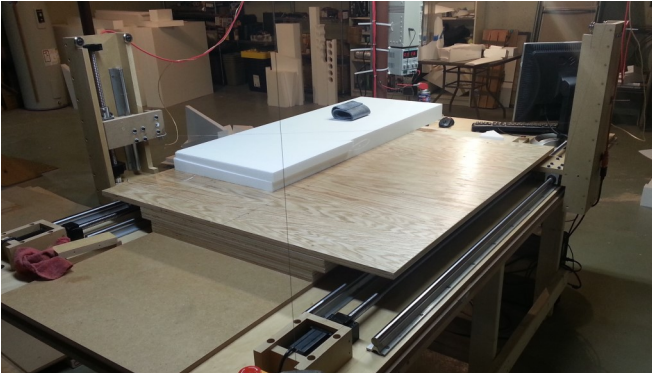


GMFC Newsletter

Send your:
News, Views, Comments, to
GMFCNewsletter@gmail.com

Home built CNC machines...

A eulogy to my first machine. After months of tinkering, designing, and generally swearing my first machine finally transitioned from a pile of parts to something looking at least reasonably operational. While the air had been rich with wondrous and colorful language while I was building and designing it, this was nothing in comparison to how my language degenerated when I tried to configure the darned machine, CNC Controller, GGCv2, and GMFC software to want to work and talk together.

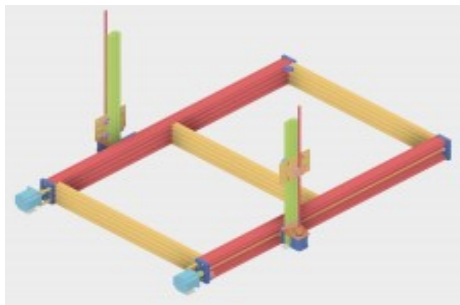


Gilles's New machine

Over the last few months Gilles has also been designing and building a new machine using extruded aluminum parts, and has also provided a build blog available at <http://blog.gmfcsoft.com>

This design is elegant, simple and can be created from inexpensive parts. Available on-line or from your local metal supplier, The towers require just a linear screw and a single bearing block, cutting down both weight and complexity. This is a really elegant design because it requires no tapping for threaded bolts, everything is pretty much pre-aligned.

If anyone else is old enough to remember Mecano, this very much reminds me of a



GMFC Newsletter

Send your:
[News, Views, Comments, to](#)
GMFCNewsletter@gmail.com

Meccano kit. Simple functional and able to be put together in a few evenings.

As you can see from the bottom picture the red pieces are where Gilles has positioned his bow.

Please take a look at Gilles's blog—yes it's in French but that's what Google Translate is for.

My New/Next Machine

Now that's a wee bit more complicated—I wanted this next machine to be able to be both a CNC foam cutter and a CNC Router/Carver—which does introduce some complexities—particularly around the electronics. I also wanted to be able to change configuration from a foam cutter to a router in minutes—the design requires just 8 machine screws and the electronics reconfiguration (which will be automatic) to be converted from one mode to the other.

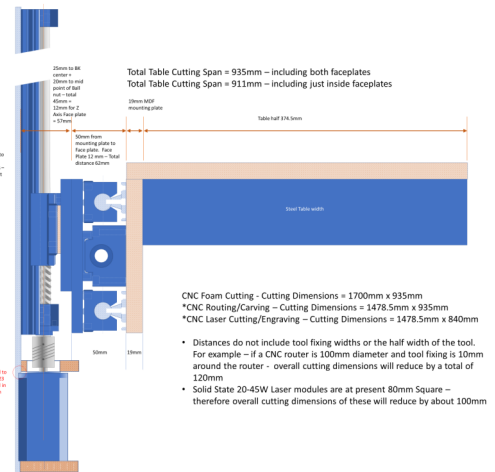
Because of the complexities of the two modes, my complete tower assemblies move up and down, rather than just the bow hangers. By doing this I can then slave the two towers together to provide the vertical Router movement that I will require.

I have also now redesigned my towers to have 33" of movement. I really don't think I need that much but

after the issues with under sizing before I decided to maximize tower length on this occasion..

A full copy of the plans will be posted on Gilles website. I would however request three indulgences:

1. That if you use the plans you let me know—and provide updates
2. If you hit issues you notify us all so that we may all learn together
3. That these are never sold by anyone claiming them to be their own—To help prevent this I will be watermarking the designs..



Submitting to the GMFC Newsletter

This newsletter will published as we feel we have sufficient content we consider of interest.. This endeavor will not succeed without your, news, views, ideas and critique. We don't need much, a little background, a couple of pictures and we will do the rest. Send your submissions to jfkpedersen@gmail.com