

GEFORCE GARAGE ANTEC 900 SERIES

HOW TO MAKE CUSTOM PARTS WITH A CNC MACHINE

FEATURING
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OF MAINFRAMECUSTOM.COM



CNC stands for computer numerical control, and it's basically magic. Give it a file, push a button, and a CNC router will carve out your design from a block of wood or a piece of aluminum while you kick back and polish off a beer.

Admittedly, that's simplified a bit. How it's actually done depends on variables including the software you're using, the type of CNC router available to you, the type of bit or cutter you have, and what kind of materials those cutters are capable of working with. And of course the complexity of your project depends on the type and complexity of your design; for instance, a 2D design will need to be extruded into a workable 3D design before being converted into the type of file your CNC router requires.

But even though the specifics vary widely, you can use this tutorial to learn how the process works in general, and even to help you decide the type and size of the CNC router you'd like to own. So-called “hobbyist” CNC routers are surprisingly affordable, the materials they use are inexpensive, and the kinds of mods you can produce with them are virtually limitless.



CNC routers are serious machines that can maim you if you don't follow the manufacturer's precautions to the letter—including wearing face and eye protection at all times. And though they may appear similar, never use drill bits in place of CNC cutters unless you enjoy the spectacle of fast-moving shrapnel.

LEVEL: MASTER
TIME: 6+ HOURS
COST: \$\$\$

MATERIALS:

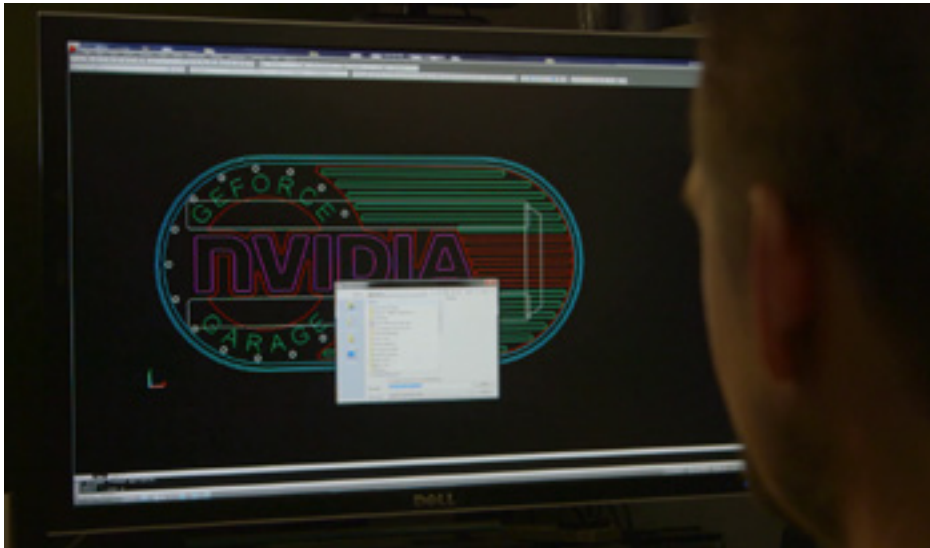
ACRYLIC

TOOLS:

CNC ROUTER

AUTOCAD (OR OTHER 3D MODELING SOFTWARE)

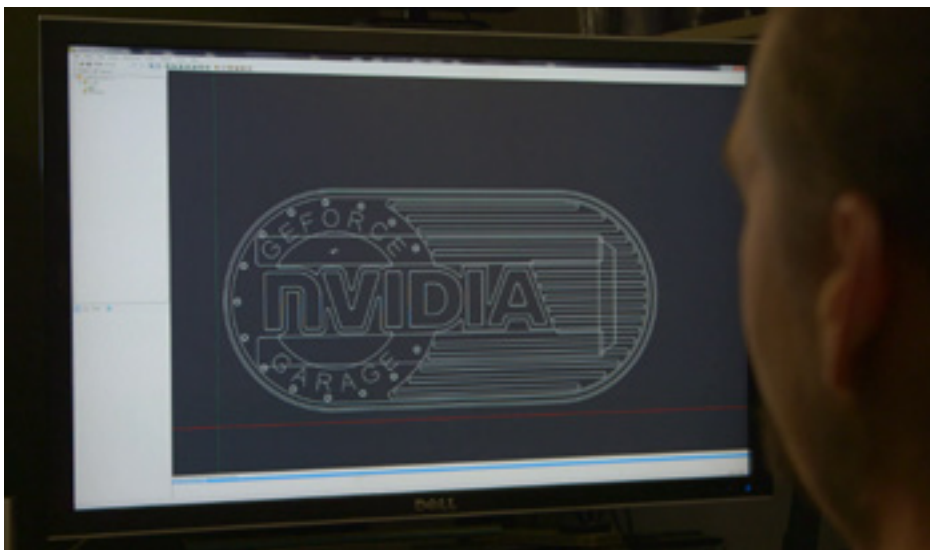
CAMBAM (FOR GENERATING CNC-COMPATIBLE FILES)



STEP 1

Export 2D or 3D file to DXF (if necessary).

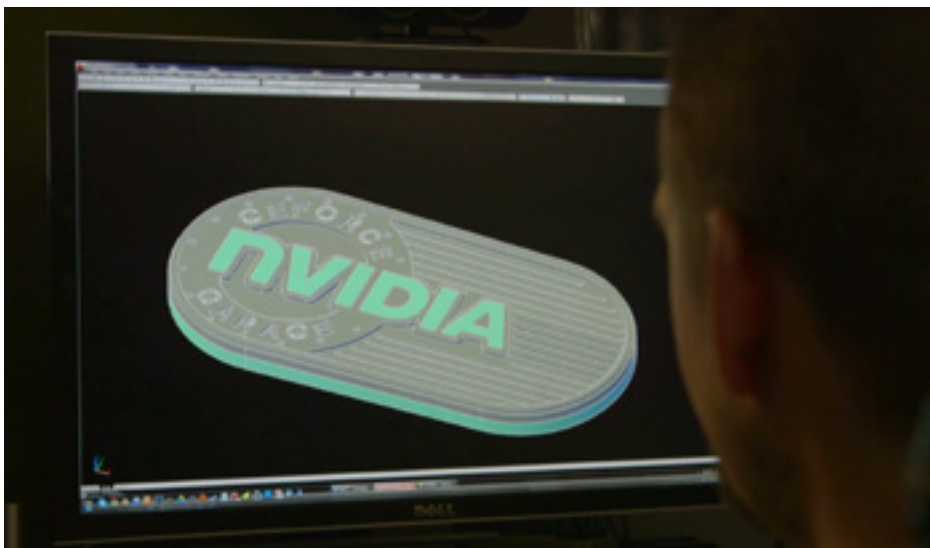
Thomas used AutoCAD to create his original 2D design and saved it as a DXF file which he'll import into CamBam in the next step. You can download an AutoCAD 30-day free trial [here](#), but a Google search will cough up plenty of freeware CAD alternatives available online.



STEP 2

Import DXF file to CamBam.

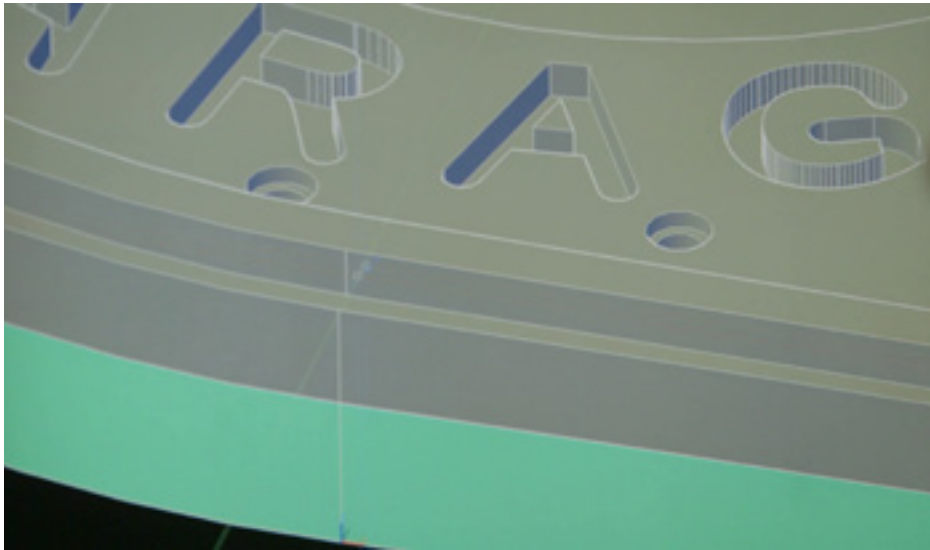
Thomas used CamBam to generate the file that contains the instructions the CNC router needs to do its thing (called "gcode"). You can download a generous trial version of CamBam [here](#), but your CNC router was most likely bundled with similar software and if not you can easily find freeware alternatives for generating gcode online.



STEP 3

Convert 2D file to 3D (if necessary).

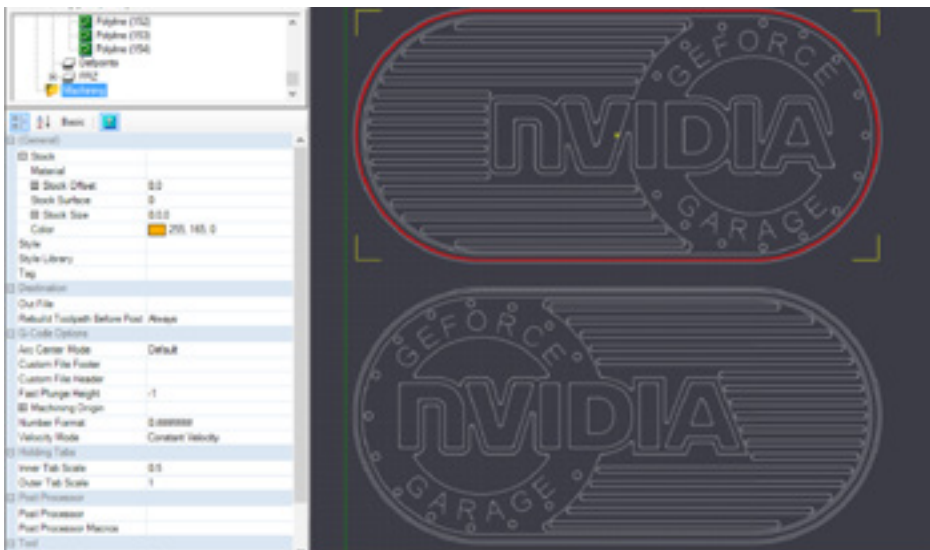
From 2:50 through 5:00 in the video, Thomas shows you how extruded his 2D file to three dimensions by adding depth information. While some software packages include features that partially automate the job, it's still a very complex process, so expect to spend some time in your software's documentation and forums.



STEP 4

Check your clearance plane and target depth.

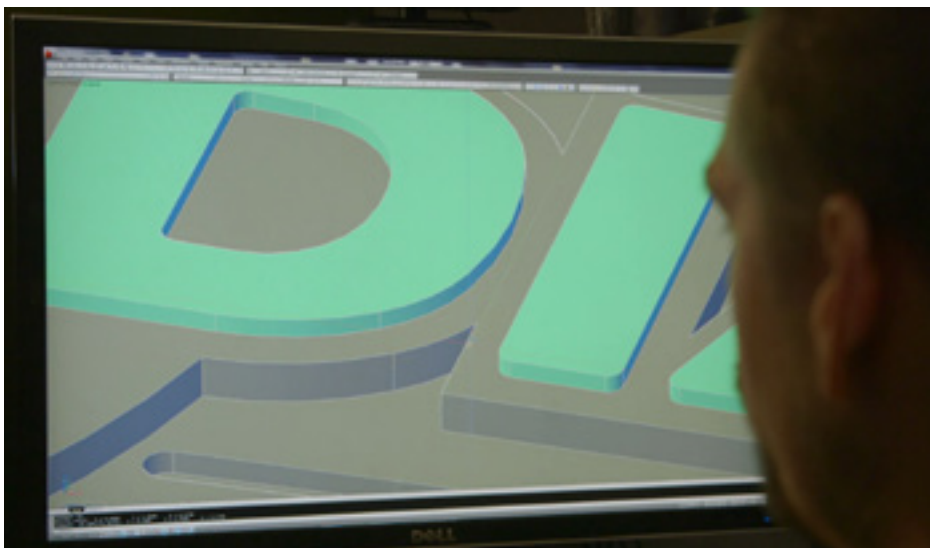
Note that Thomas pays special attention to the object's clearance plane and target depth. The former tells your cutter how high to lift itself up when it's not cutting, and the latter tells it how deep the object is so it doesn't inadvertently cut through it and into the bed. Check your software's documentation to see where these values need to be entered (and double-check them after you do).



STEP 5

Configure the software for your material.

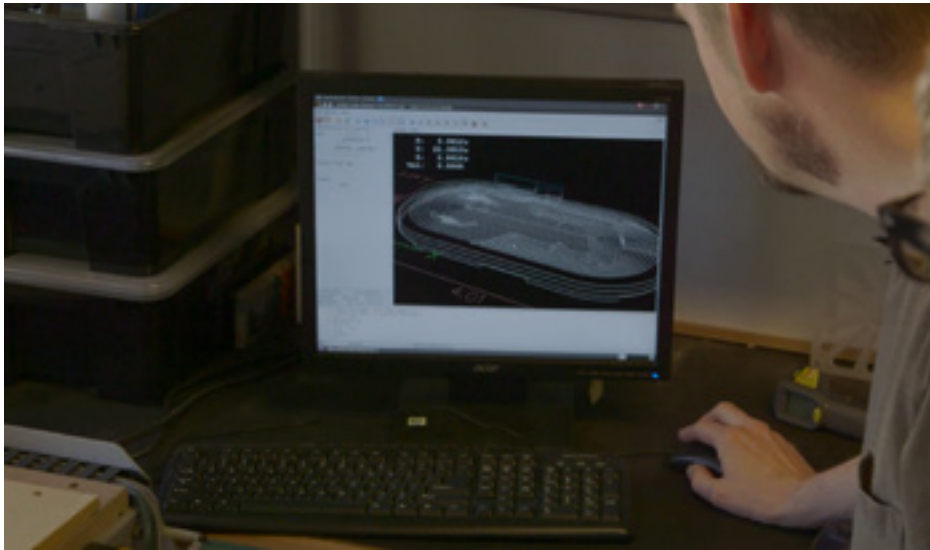
At 4:50, Thomas begins entering values (such as depth increment and feed rate) that correspond to the type of material and cutter he's using (in this case, two types of cool transparent acrylic laminated together). Again, your software's documentation should guide you here based on your materials and cutter, but keep in mind that sometimes experimentation with scrap materials is necessary.



STEP 6

Determine whether multiple passes are necessary.

Your job may involve more than one pass; for instance, Thomas points out here that he'll be using progressively smaller bits in several passes in order to cut a sharper angle between the D and second I of NVIDIA. (A good rule of thumb is to cut only to half the cutter diameter per pass. For that tiny 1/32" cutter, that's only 0.015" maximum per pass.)



STEP 7

Send instructions to your CNC router.

If you want to create the slick GeForce Garage badge that Thomas created, you can download his DXF file [here](#). Import the file into your router's software and it will convert it into code for your machine. (Note that it's a terrible idea to run code that you haven't produced yourself on the software configured for your particular machine.)



STEP 8

CNC router and bed preparation.

Secure your material to the CNC bed. You can do this with clamps, screws, glues, or even double-sided tape but make sure the material is secured firmly on all sides with no give.



STEP 9

Select and install your bit/cutter.

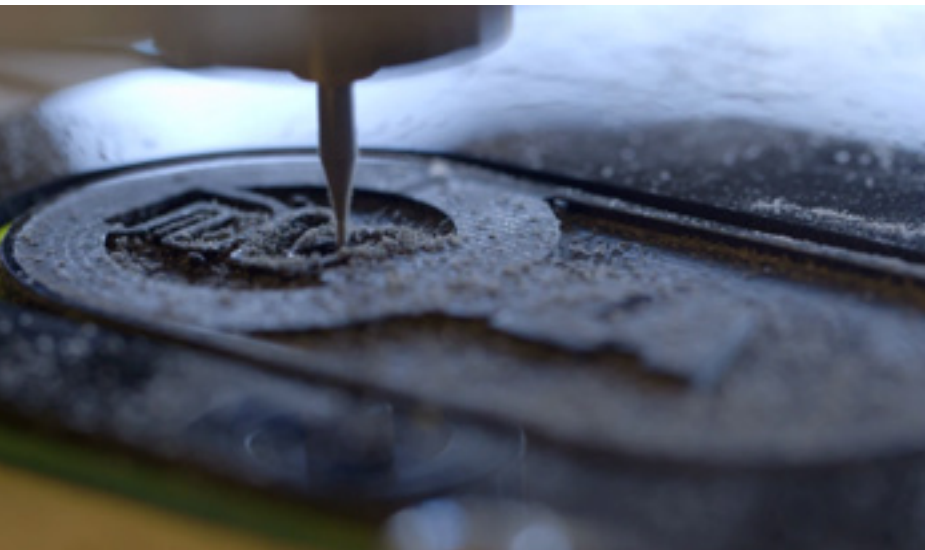
The type of cutter you want to use will depend, of course, on your material and the level of precision you need. Consult your CNC router's documentation for recommendations, but don't hesitate to ask for advice on support forums as well. Tool manufacturers are always particularly helpful—don't hesitate to ask them what tool they recommend for your material, machine and project.



STEP 10

Calibrate your CNC router.

Naturally you'll want to follow your CNC router's instructions on calibration before each job, but the idea is that you're establishing a "zero point" so the router knows where the cutter is, as well as the z axis so the router knows where the bed is (pictured). Make sure to establish the x and y axes a safe distance from the clamps or screws securing the material.



STEP 11

Press Start and let 'er rip.

Skip to 10:45 in the video to check out the CNC router in action! Note that Thomas uses a shop vac to tidy up in between passes before swapping out the cutter.



STEP 12

Detach the design.

Since the CNC router doesn't cut all the way through the material, you'll need to gently detach the design yourself. Here, Thomas is using a chisel to lightly perforate the edges of the badge, and then he carefully punches it out with his thumbs.

STEP 13

The finishing touches.

Fresh out of the CNC router, you can see that there are still a few stray bits of acrylic that need to be cut or filed down. You'll also need to do some light sanding to remove the tooling marks left behind by the cutter along the edges.

STEP 14

Light 'em if you got 'em.

Thomas is holding blue LEDs behind the badge to demonstrate how the blue light makes the acrylic's green hue really pop (which is how they'll look once mounted on his case). Get creative. Have fun. Make everybody jealous of your CNC router!



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