Laser Cutting

It took me almost a year of looking, but I finally decided which one I wanted, went to the store and bought a laser cutter. For those of you not familiar with the term laser cutter, it's a large box that has a high power laser in it. You send it line drawings and it draws those lines with the laser onto what ever object you put into it. If the laser is at a low power it will mark the object. If it is at a high power it will cut right through it.

The model I got will cut through 1/4 inch plastic, wood, cardboard and leather. It will also cut thinner pieces of each of these as well as paper and fabric. It can also mark on stone and some kinds of metal. Besides cutting line drawings, it can etch pictures on to the surface of an objects.

There's been a bit of a learning curve in figuring out how to make it work - alignment issues, beam focus, power and speed, and creating the files (drawings) needed to do the projects I wanted to do.

My first real project was cutting a Christmas ornament. I picked a simple shape - a church - that had only straight lines and arcs. I then added one word of text. Once I figured out all the settings I was able to cut one out every 67 seconds. I made thirty churches, cut out of 1/8" birch plywood, and gave them to my friends and co-workers. It was a lot of fun and I really like the feeling of giving people something I had made myself.

The cross, doors and word are etched. The windows, door and the outline were cut.

My second project was a lot more ambitious. I knew I wanted to make something 3D so I planed out a dice tower. A dice tower is a box with several slanted "floors" inside that will make sure that dice dropped into the top will come out random in the tray in front.

I cut my first model out of paper and test fitted it together. I was surprised at how close it was to correct. I made a few changes and cut the second one out of wood. It fit together and actually worked. I played with it for a while and decided it needed to be a little taller so the dragon on the front and side could line up and that the front tray needed to be deeper.

I made the changes and cut it out of plastic. The pieces fit together and it worked, mostly. In my modifications I made the slope of the bottom floor less steep. Sometime the dice stop there and don't come out.

The fourth model worked great and was also made out of plastic. It took a few tries to get the laser cutters set up
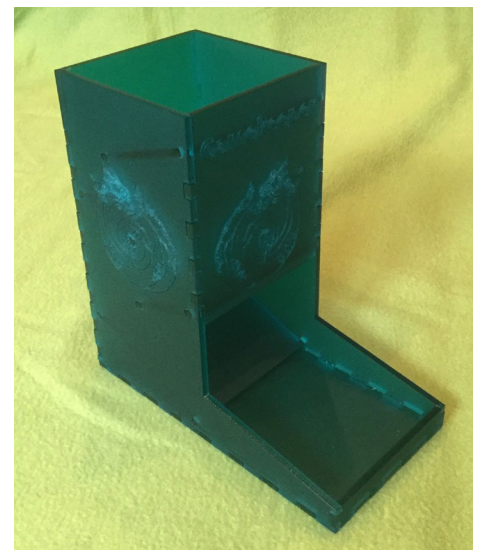
to cut the plastic all the way through, but I really like the results. The detail of the dragon is not as clear, but I like the sound the dice make better.

This plastic is opaque. I want to try making one out of transparent plastic so you can see the dice as they roll through it.

Since this projects takes a while to cut - about 10 minutes - uses a lot of material and takes a while to glue all together, I haven't gotten around to making the clear one yet.

I'm planning on taking this down to our local game shop and seeing if they would like to sell it. I can offer a custom name on the front so that it is more unique.
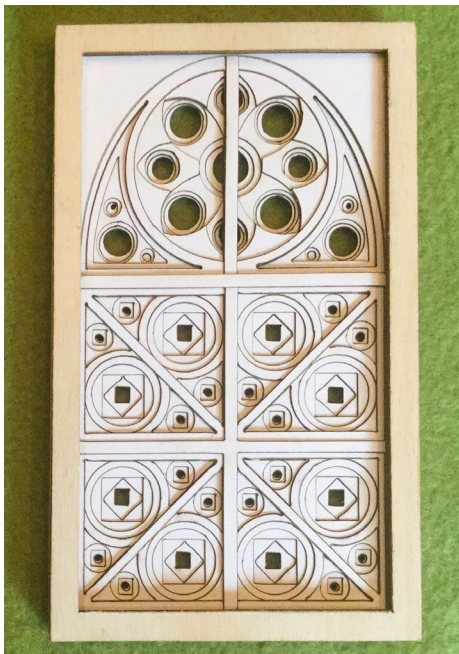
For my next projects I decided to do some simple projects. One that is simple in concept, but a little harder in execution is a layered "window".

This is my second window. It is made from eight layers of card stock, each with a different pattern of holes cut into it. When the papers are stacked it give a wonderful 3D effect. I cut the frame from 1/8" plywood as three layers. The top and bottom are the frame you see here. The inner layer has a larger cutout and fits the size of the papers.

As it turns out, the eight layers of paper are 1/8" thick so it fits together perfectly. I glued the wood frames together, but the paper is just sitting in the frame and does not move at all.

In this example each layer back has less paper removed, which give a tunnel effect. I've see other examples where the back layers have larger holes, leaving the from layers floating in front of them. This give the effect of greater depth with in the frame. I'm looking forward to doing one of these. Also, many more layers are possible - giving a greater effect. This can be accomplished by making the whole thing thicker or by using thinner paper.

My most recent project was etching words into stone. Cindy and I picked up some cut stones at a discount bead store. Each stone is 5" by 1/2". This gives me the ability to write more than a single word and have it look like it fits. This one has the words cut just into the surface. I tried cutting the letters deeper, but instead the stone expanded outward because of the heat and made blurry ridges.

These are really easy to make. The stone cost $3.50 and it only takes 10 seconds or so to cut the 24 letters. I'm going to see if I can get the stones at a lower cost so I can sell them with custom engraving.

I designed a cross, which it turns out is one of the most complex things I've made so far. The challenge was not the cutting, but the creating of the drawing. I'm using Adobe Illustrator to create my drawings. When you create the drawings you combined simple objects, in this case straight lines and circles.

I created the basic cross and them added the four circles. I then had to go through and remove all the parts of the objects that I didn't want cut. One of the problems is that you can't always tell if there are lines on top of each other, since the program only shows you the top line. The laser cutter, on the other hand, cuts all of the lines. In cutting out the cross, the first couple times it fell apart because the points where the arcs touch the cross were cut too deep.
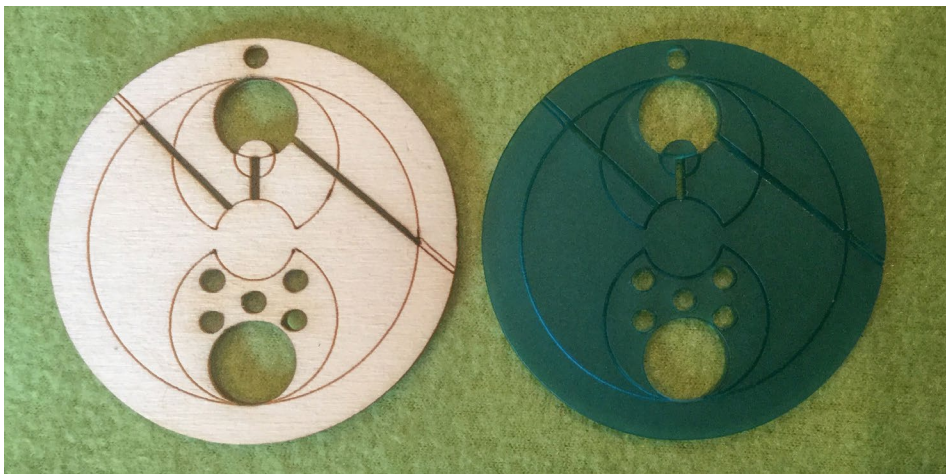
I cut the cross out of five different materials. The picture on the previous page shows black leather, reddish solid wood and clear plastic. Not shown are the plywood and blue plastic.

The idea that started all of my thinking about laser cutting (and 3D printing) was the creation of medallions that are written in Gallifreyan, the language of the Time Lords from the show *Doctor Who*.

The medallion at the top of the page has two words on it. It is read starting from the bottom and going counter-clockwise. The bottom is just the two letters "DR" the second is the three letters "Who"

This one says "Doctors Wife," which is a reference to a relationship in the show. It is the most complicated medallion that I've designed and is too fine to cut from wood.

This third medallion has my company name on it, "A Good Tail."

Another example of something I can mark on is a dice box. Here is one I made for Emma.

The last example I want to share with you is a series of pictures with frames.

I took these pictures with my iPad. I then cropped them into very wide panoramas. Then I used a water color filter on them. I printed them on my large format printer - each of them is about 19" wide.

I designed a simple frame for the pictures and cut three out of 1/8" plywood. I also cut the pictures to size with the laser cutter. The result is a frame that has no seams on the corners and has a rustic look because of the discoloration caused by the laser's burning process.

I have these three pictures hanging on the wall of my cubical at work in Santa Clarita.

Let me know if you have a custom cutting project that you'd like me to do for you. If it's something fun that I haven't done before, I probably will do it for free. Otherwise, I'll let you know how much it'll cost. For people on my mailing list, I'll do your project for the cost of the material.

Douglas Clarke

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