Project 1 - Explore 2-axis laser control
Assigned: Monday, January 22
Due: Wednesday, January 31

Abstract:
In this assignment you will begin controlling fabrication through testing and manipulating machine and material parameters. We begin our exploration using 2-axis control in the Laser Cutter. We will later expand this to 3-axes using the 3D-printer, router and mill.

The Task:
Fabrication by way of the Laser Cutter is achieved through the manipulation of several separate, yet interdependent parameters. As we have learned in the lab, one set of these parameters are the Power, Speed, and PPI (pulse per inch) of the laser's cutting beam.

Yet as with any product of the real world, such controls cannot, and do not, exist in a vacuum. Because we are necessarily manipulating physical materials with physical tolerances and physical scales, there is another set of parameters that must be considered just as completely. The "dirty" aspects of the machining process - the parameters of Material and Geometry - further complicate, and inform, the final outcome of the fabrication object. In the end, both sets of parameters - machine and material - must work together to create the desired result, or perhaps to discover an unintended one.

Your task, therefore, is to experiment, in a controlled manner, with this variety of parameters.

1. Begin by choosing a single parameter to adjust, and process a series of physical tests that vary this one parameter. Start with a hypothesis about what you are about to do. It need not be complex. A possible hypothesis could be that modifying the PPI setting, while keeping all else the same, can create varying patterns of perforation and transparency in a given material. Your hypothesis should in some manner indicate a tangible outcome, and your trials will be testing this outcome. Run a series of 5-10 fabrication tests on this one parameter.

2. Next, based on your observations from this first set, choose one other parameter to vary for another series of 5-10 physical tests. The catch, however, is that this second parameter must be from the other side of the equation. If the first parameter was a function of the laser's control, then the second should be a function of the material, form, pattern, or geometry being cut. You should again use a hypothesis. This new series will generate a new set of objects that are the composite result of both variations put together.

3. Finally, from what you learned in these two series, create one fabrication that uses the methods you have built to transform a material - to do something with it that it is usually not used to do. This could be as simple as perforating or folding a planar object through a pattern of scoring, or as complex as your imagination can devise.
Do not try to be too overly complicated, clever, or prescriptive in engineering your results. Allow the machine to give you feedback that you didn't expect. This is intended to be an exploration. Also consider that though the process is two-dimensional, the product need not be.

**What to turn in:**
Bring to class on the due date the following:
- The results of all fabrication tests.
- A printout of the geometry file(s) used to create them, with an indication of the parameters that were varied and their range of variance.
- Your hypotheses, each in a few words or sentences.

The class time will be used as an informal discussion regarding our findings. All will be expected to briefly present their results (about 5 minutes each).