

APPENDIX G: INSTRUCTIONS FOR CONSTRUCTION

These instructions are intended for people with knowledge of how to use laser cutters, orbit sanders, and handheld routers. The total process takes approximately 8 hours of assembly in addition to drying times. Exercise caution when operating any of the tools in the lab and obtain appropriate training prior to use.

The following table lists all materials to build the Number Nesting Blocks.

Table 1: Materials Used for Construction

| Material | Quantity |
|--|------------------------------------|
| Baltic birch wood (or other desired type of wood with 0.22" thickness) | 3 sheets of 24" x 36" x 0.22" wood |
| mineral oil (food grade, food safe)  | 1 |
| wood glue  | 1 |

Note: See Bill of Materials in Appendix H for cost details.

The following tools are required to construct the Number Nesting Blocks

- CO₂ laser cutter with a 24" x 36" bed minimum (Red Universal Laser or other brand laser)
- CNC Mill or handheld router with 1/8th inch rounding bit
- Clamps
- Disc sander and sandpaper
- Soft cotton cloth

The following procedure should be followed for construction.

1. Import .svg files into appropriate file for the laser cutter. Set line width to hairline (or whatever minimal thickness is available) and make each of the numbers solid and blue rgb (0,0,255). Files can be accessed at this link:
<https://drive.google.com/drive/folders/1Z0oZ8mtvNPj8S9BsXUh3v0YY4kjjLuR4?usp=sharing>

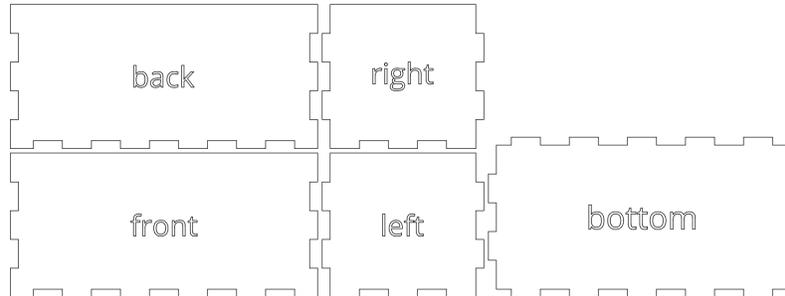


Figure 1. Files for 2-unit blocks (labels describe position in construction)

2. Use the following laser settings allowing the red lines to be cut through and blue areas for engraving of the numbers. Use one design per sheet of wood. This procedure will result in 50 individual parts for a total of ten blocks. Expect roughly 45 minutes per cut (~2.5 hours total including formatting time).

| Color | Mode | Power | Speed | PPI | Z-Axis | Laser |
|-------|-----------|-------|-------|------|--------|-------|
| Red | Vect | 100% | 2.3% | 1000 | Off | Both |
| Blue | Rast/Vect | 85% | 67% | 500 | Off | Both |

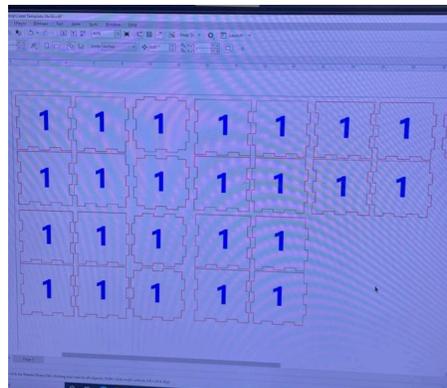


Figure 1. Example of Corel Draw file of five 1-unit blocks

3. Use the disc sander to lightly sand the front and back sides to remove excess burnt wood and melted sap from the laser engraving.
4. Assemble each box by adding a small amount of wood glue in between each finger of the box and pressing each edge joint together. The engraved number should be on the outside of each box with the exception of the bottom where the engraved number will be viewed by looking inside the box.
5. Once boxes are assembled, use clamps to hold their sides together during drying. Wait 24 hours for the glue to dry.
6. Using the handheld router with a 1/8th inch rounding bit, make passes over each of the edges of each block to round out each edge.

Notes:

- Clamp down boxes during this process to decrease chances of irregularities in the radius of each rounded edge.
 - Make passes moving towards you to increase the quality of the finish.
 - When rounding the edges that border the open face of the box, the box should be facing up (the open side on top) so that the rounding bit can be stabilized along the face that is having its edge rounded. Be careful to hold the router stable during these passes, since it will not be able to rest on the top of the box.
7. Use a sandpaper block to smooth out the corners and edges of each block.
 8. For each side of each block (both inside and out), apply a few drops of the food-grade mineral oil to a cotton cloth and wipe down excess oil.
 9. Wait 30 minutes for the mineral oil to dry.
 10. Apply a second coat of mineral oil using the process detailed in step 7.
 11. Reapply the mineral oil finish to the blocks once every few months to preserve the integrity of the wood.