Guide for assembling OMMAwell

Materials

- Extruded acrylic, 6.00 to 6.35 mm thick (see note below)
- Acrylic welding solvent

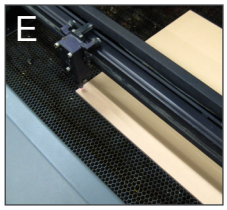
Notes on acrylic: Some suppliers sell "¼ inch thick extruded acrylic," while others sell "6 mm thick acrylic." In each case, the actual measured thickness of the material that is delivered can vary from 6.00 to 6.35 mm. We thus designed the components to fit together for any acrylic thickness from 6.00 to 6.35 mm. The pieces will fit a little more loosely with 6.00 mm acrylic and more snugly with 6.35 mm acrylic, but we've tested the designs successfully with both. Another consideration is that opaque / pigmented acrylic is often autofluorescent. Thus for any component that will be mounted in a microscope for fluorescent imaging (namely, the cylinder), it is important to cut the parts out of optically clear acrylic (such as McMaster-Carr #8560k355), although for illustration purposes the photos in this guide depict opaque white acrylic.

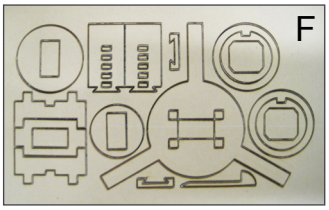
Equipment

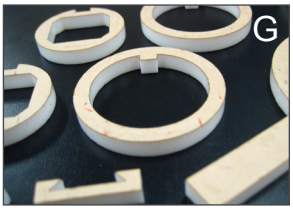
We used a Universal Laser Systems laser cutter, model PLS 6.75 (panel E below). Any laser cutter/engraver that can cut acrylic of this thickness will do.

Step-by-step instructions

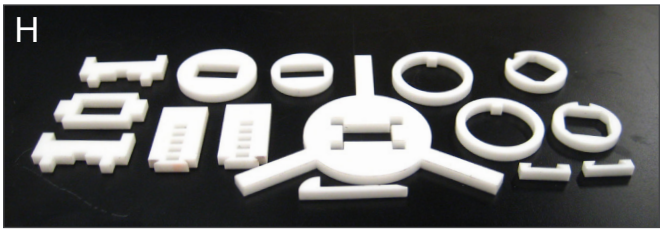
1) *Laser cut the acrylic pieces.* In Supplemental Materials S3, the file named "OMMAwell_all_components.dxf" has all the pieces except for the insert. The reader could use one of the user-tested inserts described in Supplemental Materials S2, or design a custom insert. Most acrylic comes with a protective backing. Leave it on during cutting (E, F, G).



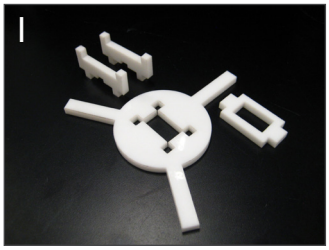


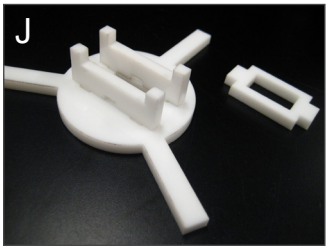


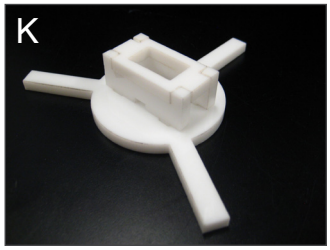
2) *Peel the backing from all pieces* (H). The remaining steps walk through how to fuse the acrylic parts together for each component.



3) *Assemble the upright platform*. Gather the 4 pieces shown (I), then slot the side walls into the tripod and fuse them in place (J). Then add the top slot and fuse in place (K). Set aside.

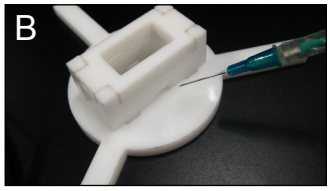


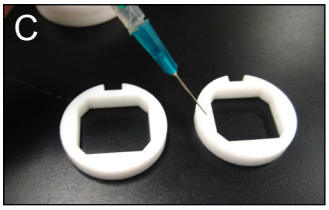


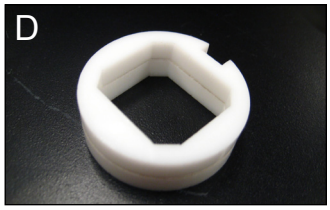


How to fuse acrylic components together

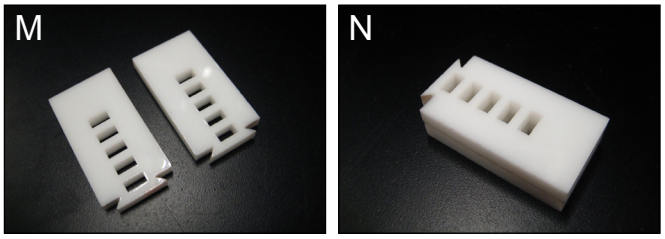
Fuse pieces together by first arranging them in the desired configuration (you can use masking tape to hold them together while fusing, although in our hands this was not necessary). Then drip acrylic welding solvent (e.g. IPS Weld-On 3 Acrylic Plastic Cement) into the joint with the supplied applicator or a polypropylene syringe with a blunted steel tip (A, B). The solvent has a very low viscosity and will easily wick into tight joints. It is not necessay to apply any pressure. When connecting two pieces that share a flat surface, another option is to apply a few drops to the flat surface of one piece, and then place the second piece on top (C, D). Assemble pieces on a disposable surface or on a piece of glass. Extra solvent will evaporate away in seconds. Pieces will be fixed in place within a minute, and fully set within a few hours.



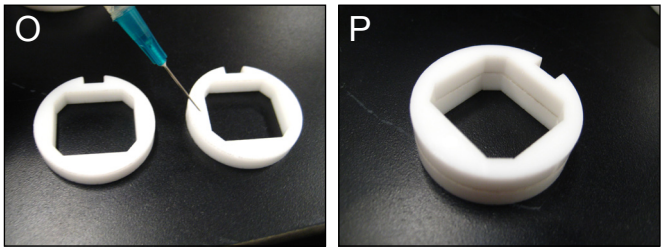




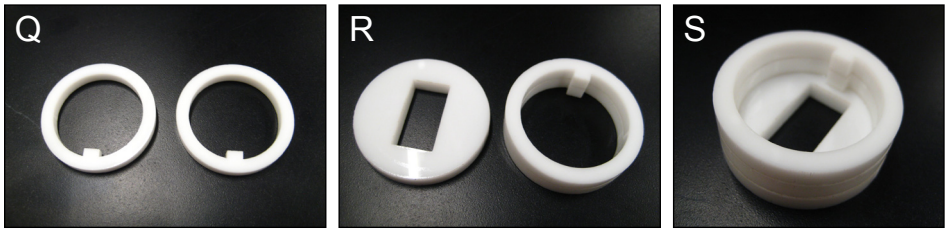
4) *Assemble the slide.* Take the two identical pieces, align them on top of one another, and then fuse them together (M, N).



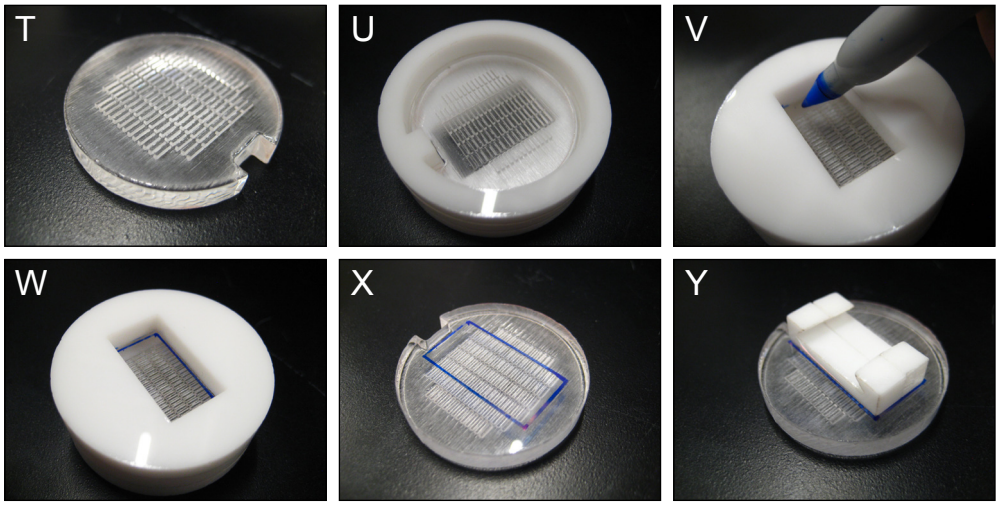
5) *Assemble the cylinder.* Take the two identical pieces, align them on top of one another, and then fuse them together (O, P).



6) *Assemble the sheath.* Take the two identical ring pieces (Q), align them on top of one another, and then fuse them together. Then fuse these to the base as shown at right, with the protruding rectangular tab centered on the short end of the rectangular hole in the base (R, S).



7) *Attach the slots to the back of an insert.* Once you have designed and fabricated an insert (e.g. T), you will need to attach slot pieces to the back of it. First place the insert into the now-completed sheath (U), and then trace the rectangular opening on its flat side (V, W) and set aside the sheath (X). Position and fuse two slot pieces side by side in the traced rectangle (Y).



NOTE: The part highlighted in the red box (Z) is an optional piece called the slide lock. When using Configuration 1 (Figure 2, top), this piece can be put on the slide before connecting the insert to the slide. It then locks the insert in place.