Intro to Papercraft: Structure and Detail

with David Canavese of Otherlife Art

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TOOLS MATTER.

◊ Good Detail Scissors.

Be aware that blunt-tipped scissors make accuracy difficult. I recommend sharp-tipped scissors. I use "Westcott Kleencut 8 inch Straight" scissors.

◊ Hobby Knives.

Get a box set of hobby knives, especially if working small. Mostly I use #11 blades (pick up an extra pack of these). #19s are good at cutting thicker material, and a good selection of other blades is also recommended. When you dull your first #11, keep it to use as a probe, glue applier, and pick-up tool.

◊ White Glue.

White (Elmer's) glue dries gradually (lending you more work time), is strong yet bendable, comes off fingers easily, and is forgiving to work with.

◊ Self-Healing Cutting Mat.

Unless you hate your table…

◊ Mechanical Pencils & Ruler.

For drawing my parts prior to cutting them out, I use mechanical pencils, which provide a sharper line. You may need a ruler to help you measure parts and cut straight lines. I prefer an 18-inch cork-backed metal ruler (you can find one at Staples).

◊ Geometry Compass / Circles Template.

If you plan to cut lots of circular parts, I recommend one or the other of these.

◊ Graph Paper.

I frequently use graph paper to sketch my models at the appropriate scale before I start building. I can often trace some parts directly from the sketch.

BEGINNER TIPS.

○ When in doubt, make pieces slightly oversize. Test-fit; if it's too large, trim slightly. Repeat as needed. If you overtrim, you may need to re-cut your part.

○ Use patterns for identical pieces. Keep your original and use the copies. For difficult shapes, use the original as a stencil and trace around it with a pencil (you may need to adjust slightly, since stenciling enlarges the new part slightly). With simple parts, I can sometimes layer paper underneath and scissor around the part to produce copies, but take care not to cut into your original!

○ Use layers to hide flaws and build strength. If you wind up with gaps or blemishes, hide it with another layer of paper! If a join seems weak, you can add a layer or two of paper across the join, or spread glue across it with the tip of a dull blade. You can also seal small gaps with white glue. Remember that the glue shrinks, so even a large bead will not be very noticeable once dry.

○ White glue is a good sealer. You can experiment with coating your finished products. Depending on the size of your finished piece, you might apply glue with the tip of a dull hobby knife or a small brush. White glue, once dry, adds strength, but because it's water-based, it can warp paper while it's still wet. Take care when applying glue to large areas Mat board won't warp, but index card and paper will. Brush it on thin, or a little bit at a time. Once a single layer has been applied and is dry, you can apply thicker layers.

◊ Curves and Cylinders.

○ You can create a toolkit of cylindrical objects of varying diameters. Straws, acrylic rods (cheap online or at TAP Plastics), pencils, hobby knife handles, wire – you can wrap paper around any of these to help you create cylinders. Remember that your part will be slightly larger than the diameter of your object, and its final size will also depend how many times you wrap the paper. Use nonporous objects so your parts won't stick to them.

○ To smoothly curve a part, run it gently back and forth along the edge of a table using your finger. Experiment. Use varying pressure or amount of repetitions to create gradual or sharp curves.

○ For larger cylinders, cut out two mat board circles and two strips to glue around their edges. Curl a rectangle of index card around the two circle forms, but use glue sparingly to keep from warping the cylinder where it meets the inner forms.

If the cylinder warps, wrap and glue a rectangle of mat board around it, but be sure to curl it tightly first. You can use rubber bands to secure it while it dries.

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◊ Compound Curves.

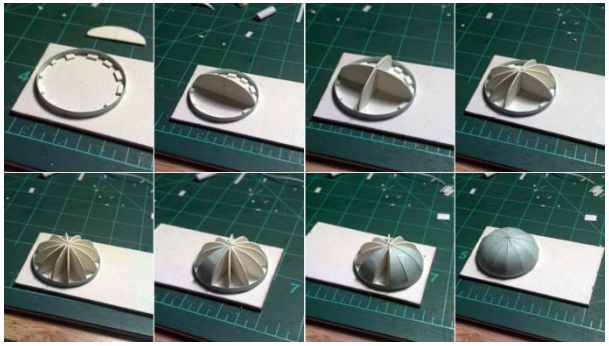
A compound curve is a shape that curves in more than one direction, such as a dome or globe. Streamlined items like jet planes and sports cars are made almost entirely of complex compound curves. Because paper bends easily in one direction (to make a tube) but not in two, creating compound curves can be a real challenge.

There are different strategies and methods for this. Some are better suited for small parts, others for large curved shapes. Below I'll give some examples of how to create the simplest compound shape: a dome. The same techniques can be modified to create half-domes, ovular bubbles, spheres and more.

Method ①: Bubbling. (Tiny parts) This is a new method I discovered recently, but it requires extreme patience. To make tiny dome shapes, or "round" the edges of parts, you can apply multiple layers of glue to the same spot. The glue shrinks a LOT as it dries, requiring a dozen layers or more to give it the desired thickness. (left below)

Method ②: Carving layers. (Small parts) Cut out small circles or ovals from mat board and glue them top to bottom in several layers. The number of layers depends on the height of the dome you want (middle above). Use glue sparingly. Wait for glue to dry completely. Using a sharp hobby blade, shave the cylinder down into a dome shape (right above). Covering the dome with an outer layer of paper (in segments) can help smooth over any rough edges. Applying glue to your segments and waiting a few moments helps the paper soften and prepare to follow the curves better.

Method ③: Ribs & sections. (Medium & large parts) Using a compass, draw a circle for the circumference of your dome. Cut small squares of mat board and glue them at regular intervals around the inside edge of the circle. Cut a thin strip of paper and glue into a ring. Glue the ring of paper around the squares.



Cut a part for a cross-section of your dome from mat board, then trace and cut 6 more, keeping the original as a backup pattern. Glue one upright across the center of the ring. Cut the others in half and glue two at right angles to make an 'X'. Glue the others at regular intervals – two per ninety-degree wedge. You may need to trim them slightly to fit. You should now have a dome consisting of 12 'ribs'. Cut a piece of index card to span one of the 12 wedge-shaped spaces. Trace and cut 12 more. Curl your wedges and glue them in place until the entire dome is covered. If desired, layer paper over the dome in sections.

WORKING TINY.

Why work so small at all? At small scales, the benefits of sculpting in paper are maximized. Paper is lightweight (your works will rarely be damaged even if they fall from a great height), Your material will stretch a lot further, and your finished pieces are easier to store.

○ When working small, good lighting is key. Use magnification if you need it – luckily (so far) I don't.

○ Thicknesses are your friend. Get typing paper, index cards (I like 5x7s, unlined), and a couple different thicknesses of mat board. When working small, a few layers of mat board go a long way for creating thick parts and shapes.

○ A hobby knife is your main tool. Use a blunted #11 blade to apply tiny dabs of glue, then (with most of the glue wiped off), use it to retrieve tiny parts and move them to the glue-wetted area. Use the blade to wipe away any excess glue.

○ Be aware that the many layers that go into mat board tend to separate more the smaller your parts are. You can always glue them back together if need be, but try to cut layered parts with the "grain" going along the longest direction. You can also coat the edges of the mat board with glue, or glue on outer layers of paper to help prevent separation.