Vince Pitelka, 2018

Clay Studio Tools: Buy, Make, Find, Improvise

It is a joy to use good tools, and invariably the work we make is greatly affected by the tools we use. Most tools are extensions of the human hand. Our hands are all physically similar, but the way we train them and use them is very different. Consider that every commercially-made clay tool was designed for someone else's hands and someone else's ways of working, with their particular needs in mind. Some may be well-adapted to your needs, while others will be awkward or even useless. When you design and make a tool yourself, you determine the possibilities and limitations.

Banding Wheels and Turntables: Anyone who uses banding wheels frequently should invest in one of the high-quality aluminum and steel precision units. They are such a joy to use. If you are in a budget, the commercially-made particle board banding wheels work well, but the bearing is exposed between the two particle-board disks, and must be cleaned and re-oiled periodically. If you really want to save money, make your own banding wheels using lazy-susan bearings available online. See the handout on my website explaining how to make throwing bats for information about how to cut perfect circles from plywood, MDF, or particle board on a bandsaw.

Bats for Throwing

For making rigid bats from plywood, MDF (medium-density fiberboard), 1/4" Masonite, Plexiglas, or PVC sheets, you will need access to a skill-saw or table-saw, a bandsaw, and a drill-press, but if you can get access to those tools you can make bats very cheaply that are as good as any that are commercially available. Rather than repeating the instructions here, go to the "Documents and Information" page of my website and download the PDF handout on making bats.

Canvas as an Alternative to Bats: When throwing wide low forms such as large bowls and plates, rigid bats are the best system. Many other forms, especially those that are cylinder-based, may be thrown on canvas squares, allowing easy removal from the wheel without touching the pot. Use any heavy canvas. See the PDF handout on my website.

Brushes: Fine East Asians brushes appropriate for use with glazes, slips, and patinas are widely available online. These brushes are worth the money, and a delight to use, but why not try making your own? Bamboo is the traditional handle material, and is available online with a little research or from anyone with a bamboo patch in their yard. Any wooden stick, branch, dowel, etc. with a hole bored in the end will serve as a handle. All sorts of natural and synthetic bristles will work. On Clayart discussion forum a number of people have reported harvesting excellent brush material from road kills, although that will take a strong stomach. If this approach appeals to you, carry a kit in your trunk including a sharp knife, scissors, disposable gloves, paper towels, disinfectant, and a supply of large re-sealable bags.

If you live in an area where hunting is popular, a variety of hair and fur is available from businesses that do custom processing of wild game. Suppliers of materials for fly-tying sell a variety of kinds of fur and hair. Some varieties of animal hair or fur is quite coarse, but it still can be excellent for many brush applications. Skunk tails are quite coarse, while opossum fur is very fine. The underside of a white-tail

deer's tail is composed of very fine long bristles, excellent for making brushes, as is the hair on the belly of many dogs. Human hair varies widely in fineness, but obviously only straight hair will work.

Some natural fur and hair has an oily surface that resists water, and this will obviously interfere with its use in a brush. Usually, the oils can be washed out by soaking in a strong soap solution.

Whatever kind of hair or fur you use, for best results, prepare by cutting it to length, but when possible always leave the natural ends intact for the brush-tip. Group the bristles for the desired size and shape of brush tip, and bind it tightly with nylon thread or thin brass or copper wire. Experiment with different groupings. Some of the best brushes have slightly stiffer, shorter bristles in the center, with longer softer bristles covering them on the outside. Striping brushes for laying down long even lines have a long thin group of bristles with very little taper along the length. East Asian brushes often have graduated bristles, the longest on the outside, becoming gradually shorter towards the center, giving the classic pointed tapered brush head. The advantage of this is that in use one can press down for a wide line, or ease up brush contact and leave a thinner line, all the way down to a very fine line when only the tip is touching.

After binding, apply a generous coat of high-quality waterproof glue to the base-end of the bound bristles. If necessary, wrap thread around the glued bristle ends to produce a cylindrical stub. Allow the bound bristles to dry, and then use the same glue to affix them into an appropriate handle. Some brush-makers like to cut a small groove around the handle about 1/4" up from the bristles, and bind it with nylon thread or wire to reduce the chance of the handle cracking from repeated wetting and drying. If you experiment with different woods you will find that some are very resistant to the long term effects of wetting and drying. As a general rule, never leave a brush soaking in liquid for long periods of time, as this will drastically shorten its life.

Brushes for creating interesting surface textures may be made from a wide variety of grasses and reeds, or by cutting small segments out of wood-backed scrubbing brushes or wire brushes.

Combing/Texturing/Scoring Tools: For applying a combed texture, use pieces cut from ordinary combs, a fork, a triangular pastry-texturing tool, an applicator trowel for tile adhesive, or sections cut from band-saw or saber-saw blades. For combing or scoring clay surfaces, the stainless steel version of a pastry-texturing tool or sections of saw-blades work very well.

Cut-Off String: When throwing off the hump, Japanese potters use a loose-end cut-off string with a single handle. For best performance it must be made in a specific way. Take a short length of dowel, drill a hole through one end, and tie on a 13"-length of upholstery thread, so that you have two 6" lengths hanging free. Place the handle in a vise, or poke it into a large lump of stiff clay, so that the threads hang loose. Examine the threads closely, with a magnifier if necessary, to determine the direction they are twisted, and *separately twist them further in the direction they are already twisted*. After twisting them as much as you can, combine them at the ends and twist them in the opposite direction ***together***. Without releasing them, tie a small knot in at the free end, and trim off any uneven length beyond the knot.

If this is done properly, you will have a string composed of two permanently twisted threads, which when pulled through the clay will leave a surface that is slightly "corrugated," admitting air into the joint and allowing the thrown form to easily be lifted off the hump. It also leaves a very pleasing pattern on the bottom of the vessel.

Cut-Off Wires: Great cut off wires can be made from stainless steel fishing leader, available from good sporting-goods stores, from "Tiger-tail" wire used for stringing beads, available from jewelry suppliers, or from stainless steel flying lines for control-line model airplanes, available from hobby and model-building suppliers. The latter is multi-strand braided stainless-steel aircraft cable in a range of thicknesses. The .021" is appropriate for normal cutoff wires. I use wire as thin as .012" for cutting thin slices from patterned colored clay loaves for clay marquetry work. Making your own cut-off wires saves money and allows you to choose the length. Tie the wire securely between two short pieces of dowel or two bisque-fired beads, or use the handles from broken cutoff wires.

Drills for Clay: Cheap drill-bits do a good job of drilling leather-hard clay. Purchase drill bits of all the sizes you want, along with appropriate diameters of wooden dowel for handles. Mount a drill bit in an electric drill, and drill a hole centered in the end of an appropriate piece of dowel. Remove the drill from the drill-chuck, and glue the blunt end into the dowel. Repeat with all the other sizes. Don't make the handles larger in diameter than they need to be, because the smaller sizes are easier to spin between your fingers.

Drill-Mixer: Most of us have used the standard commercially available impeller-mixer attachments for electric drills, useful for mixing slips and glazes. If you are on a tight budget, go to your local home improvement superstore, and examine the range of mixing attachments they have. These will range from very small ones for mixing paints, to huge ones specifically designed for mixing drywall mud in five-gallon buckets. All but the latter are useful in ceramics. Examine any possible mixing attachment closely to make sure it has no abrasive surfaces that might erode through the plastic bucket.

If you are determined to make your own drill-mixer attachment, take an appropriate length of 3/8" steel rod, and weld a 5" length of steel chain onto the end, so that equal lengths of chain hang free on either side of the link welded to the rod. In use, be careful not to let this mixer beat the sides of the bucket.

Feather-Combing Tool: For manipulating liquid slips in marbled or feather-combed patterns - nothing else works as well as a 2" length of 50#-test nylon fishing line glued into a ½" deep hole in the end of a piece wood dowel. For a quickie tool, just tape the fishing line to the end of the dowel. Anything stiffer than fishing-line will dig into the base clay and ruin your day. If you find that the tool doesn't move the slip enough, hold the tip of the fishing line close to a lighter flame to form a small expanded ball on the end. For parallel lines you can glue a series of pieces of fishing line into holes drilled in a larger piece of wood.

Fluting Tool: A very effective fluting cutter can be made from a 1 ½" by 6" strip of 18 to 22-gauge sheet metal. In the center of the strip one inch from one end, drill a hole of a size corresponding to the width of flute you want to cut. With sturdy C-clamps, clamp two strips of hardwood, or two lengths of steel flat-bar along each edge of the sheet metal strip, so that section exposed down the middle along the

length of the strip is just barely wider than the drilled hole. Take the drill-bit out of the drill and insert the blunt end in the hole. By forcible tilting the drill-bit as far as you can towards the end of the strip you will distort the hole, raising one edge of the hole and lowering the other edge, forming a cutting edge very much like a cheese-grater with only one hole. For larger drill sizes, or for thicker sheet-metal you may have to use a piece of pipe or steel tubing as an extension handle over the end of the drill-bit for increased leverage. The strips clamped along the sides are absolutely essential, because without them, when you try to tilt the drill-bit and distort the hole, the entire strip will simply bend.

Clamp the strip horizontally in a vise, and with a round file sharpen the cutting edge inside the hole. With a flat file, remove any burr left on the outside surface of the cutting edge. Be sure that you sharpen the edge that will cut as the tool is pulled towards you. Sand the outer edges of the strip to remove any sharp burrs.

To use the fluting tool, drag the raised edge of the hole along a leather-hard clay surface, cutting out a smooth even flute. The flat areas around the hole control the depth of cut.

Glaze-Mixing Whisk: A large wire whisk for hand-mixing glazes or slips can be easily made from a piece of heavy wooden dowel or tree-branch 1 ½" in diameter, four 36" lengths of 1/8" brass or stainless-steel welding rod, and a 1 ½" stainless steel hose-clamp (available from any auto parts store). Cut a length of dowel or branch at least 12"-long for a handle. With a pencil, lay out four lines across one end of the dowel, dividing it into eight pie-slices. Along each of these lines, with a hacksaw cut four slots 2"-deep straight into the end of handle. Along each of these slots, on the end-face of the handle, drill a 1/8" hole 2"-deep, 1/4" from the outer edge (total of eight holes). Bend one of the welding rods over a 4"-diameter form (a piece of pipe, a can, etc.) to create a U- shape with equal-length legs. Insert the legs of this U-shape into a pair of opposite holes in the end of the handle. Repeat with the other three pieces of welding-rod. Slip the hose-clamp over the handle and tighten securely over the slotted end of the handle ½" from its end to securely lock the rods in place. At the point where the four wire loops meet at the business end of the whisk, it may help to wrap and twist some thin, stiff wire to hold the loops in place.

For general glaze mixing, this whisk works much better than a stick, and is especially useful for mixing glaze in a wide shallow pan or wok, such as one might use for glazing plates and bowls.

Hole-Punches: For making holes in soft clay, good hole-punches can be made from any thin-wall metal tubing. The brass tubing used in model-making works well. In plumbing shops you can get thin-wall brass or copper tube in a variety of sizes. Depending on how you plan to use the hole-punch, cut either a straight or a bevel end in the tubing, and unless the metal is extremely thin, carefully sharpen the end on a bench grinder. Cut a piece of appropriate-sized wooden dowel to poke out the cut slugs of clay, and keep it with the punch. If you want to mount your punches in a wooden handle, make the tube extend all the way through the handle, so that you can still poke out the cut slugs.

Jug Finger (Potter's Finger): When throwing jugs and bottles it is often advantageous to close in the neck before bringing out the belly or shoulder. The form can then be resolved with a jug finger, a long straight or curved stick with a bulbous end, which is inserted through the neck and used to apply

outward pressure against the inside walls. Traditional Early American jug-fingers often just had a wooden bulb on the working end, and were often made from an appropriate-shaped tree branch. For a simple and effective jug-finger, wrap a chunk of scrap sponge over the end of a 16"-piece of ½" wooden dowel. Wrap a piece of chamois over the sponge, tie it off tightly with upholstery thread or thin wire, and trim off the excess chamois - it will look like the drumstick for a kettle drum. In use, soak the bulb end in your water bucket, and it will be self-lubricating. After necking in the form, shake off excess water, insert the bulb end in the neck, and with the wheel turning apply the necessary outward pressure against the inside of the form to achieve the desired shape, always with corresponding finger or sponge pressure against the outside of the form.

For a more elaborate and versatile curved jug-finger, trace the desired profile on a hardwood board, cut it out on a bandsaw, shape and sand the edges and profile, and make the same kind of sponge/chamois ball on the end. Such a curved jug-finger is required when forming a broadly expanding shoulder beneath a long and/or narrow neck, as a straight jug-finger will not work in this application.

Knives for Clayworking: All sorts of knives are handy in the clay studio. In general, it is the thinness of a knife blade and the flat surfaces that make it cut easily and follow a line, and a sharp edge is unnecessary. For that reason, whenever using a purchased or recycled knife-blade, always grind off the sharp edge by rubbing with a piece of high-fired clay or silicon carbide kiln shelf.

For general piercing and cutting of leather-hard clay, I prefer to use the commonly-available X-Acto knife with the 1"-long blade tapered to a fine point, available in any stationary store or art supply store and many hardware stores. For many applications, I have found that cheap, thin steak knives work very well, and can be reshaped to your needs on a bench grinder.

Modeling Tools: You can find or make a wide variety of wooden modeling tools useful in throwing and hand-building. Some existing wood shapes work well, such as popsicle sticks, tongue depressors, wooden spoons, chopsticks, and bamboo cocktail skewers. Wooden dowels, strips of hardwood (often available for free from sawmills or cabinet shops), or strips split from a length of bamboo can be cut and shaped to the desired contour with a saw, carving knife, sander, grinder, file, and/or sandpaper. A length of 1/4" dowel sharpened in a pencil-sharpener and sanded to a slightly dulled tip (or a dull pencil) is especially handy for signing the bottoms of pots.

Needle Tools: Make your own needle-tools with a length of 3/8" wooden dowel and a sturdy sewing needle. With very small needles, clamp the point-end of the needle securely in a bench vise or hold it in vise-grip pliers, and tap the dowel-handle onto the blunt end of the needle shaft. For larger needles, drill a 1/16" hole in the end of the dowel, and glue the needle shaft in place.

Paddles and Anvils: Both thrown and handbuilt forms may be shaped and resolved using a paddle on the outside, sometimes with a heavy rounded “anvil” held in a corresponding place on the inside. A variety of sizes with both flat and curved faces work well for different applications. Paddles can be cut from any kind of wood with a bandsaw or saber-saw, but hardwood has more weight.

The anvil is normally a rounded river stone, but a rounded hardwood block works well, or even some stiff clay wrapped in canvas. If you do not have access to rounded river stones, form your own with clay, with different curvatures on the opposite faces to make them more useful. At the soft-leather-hard stage, poke holes deeply overall with a needle tool so they don't blow up in the bisque-firing. At the hard-leather-hard stage trim the surface with a Surform tool to achieve the final shape you want. Bisque-fire them, but do not fire them to higher temperature, because the porosity is necessary so they release from the clay surface.

Patterned Paddles: A layer of string, cord, or rope wrapped around a paddle will produces interesting pattern effects. Sawed groves or holes drilled in the surface of the paddle also create interesting patterns. Or, make a textured tile, bisque fire it, and cement it to the surface of a wooden paddle. A dry corn-cob makes a very good small texturing paddle.

Profile Ribs: Any rib may be altered by carving, cutting, sawing, or grinding a profile on one or more edges. When pressed against the outside wall of a well-lubricated spinning thrown form (with corresponding gentle sponge pressure on the inside), or when dragged over any well-lubricated clay surface, the profile will create a contour band, similar to ornamental wood molding. The same will happen if the profile rib is carefully dragged along a well-lubricated strip of slab.

Ribs: A wide selection of rigid and flexible ribs are useful in both throwing and handbuilding. Possible materials for flexible ribs include old credit cards, CDs, plastic food containers, plastic bucket lids, thin sheet metal, sidewall from a tire, Teflon sheeting, canvas or rubber machine belting, or any other slightly flexible material. The thinner, softer materials may be cut with ordinary scissors, while the thicker, harder materials may require a pair of sheet-metal shears or a saber saw, bandsaw, or scroll saw. Plastic applicators used for automotive body putty, available in auto-supply stores, make very good semi-flexible ribs, and are easily cut to smaller sizes.

Rigid ribs can be made from Formica scraps, Masonite, Plexiglas, plastic sheeting, thin slices of hardwood, sheet metal, coconut shell, or dried gourds. All of these will require at least a coping saw or hacksaw, and for best results a saber saw, bandsaw, or scroll saw.

Rollers and Rolling Pins: It is not practical to make your own rolling pin, but there are some considerations when selecting one. Get the best available, and don't settle for one with fixed handles, where the entire unit is made from a single piece of wood. Purchase a good heavy rolling pin with plastic bearings or ball bearings. The larger the diameter of the roller, the more clearance for your knuckles when your fingers are wrapped around the handles. You will find the best prices at restaurant supply and kitchen stores and websites.

Smaller rollers are very handy for a variety of tasks in the studio. The standard wallpaper seam-roller, available from interior decorating and building stores and websites is an inexpensive and useful tool. Get one with a wooden roller if possible, so that it may be shaped on a bench grinder if necessary. Small printmaking brayers, such as are sold for linoleum block work, make excellent small rollers for general studio use. All sorts of other rollers, available at flea markets, second-hand shops and kitchen stores,

may prove very useful, depending on what kind of work you do. A very handy small roller can be made from a caster wheel mounted in a wooden handle.

Saw for Clay: There are times when one must cut hard-leather-hard or bone dry clay. The normal piercing saw made for cutting drywall works well, but any saber-saw or reciprocating-saw blade glued in a wooden handle makes a superior clay saw. Those blades have the advantage of cutting on the pull-stroke, which seems to work far better with clay.

Scraping and Abrading Tools: We are all familiar with the standard stainless steel rib, which is often used scraping leather-hard or dry clay. A broad range of other tools and supplies work very well for scraping or abrading the clay surface, including drywall and cabinet scrapers. With any metal scraper, frequent sharpening will help. Do not sharpen clay scrapers at an angle like a knife blade, because they will just dull very quickly. Hold the scraper at 90 degrees to the surface of a sharpening stone or a piece of silicon carbide kiln shelf, apply firm pressure, and rub back and forth in line with the blade.

One of the most popular shaping or abrading tools in contemporary ceramics is the ***Surform*** file or plane, a woodworking tool from the Stanley Tool Company. It has a blade like a cheese-grater, and is available form most good hardware stores. Some suppliers carry imitations, which seem to work fine.

All sorts of scrapers and knives found in building-supply stores and second-hand shops may work for scraping and abrading clay surfaces. Cheap plastic or metal putty knives and scrapers are often useful.

Sieves for Glaze/Slip: For straining small amounts of glaze or slip, fine-mesh kitchen strainers work great. You can make your own larger glaze sieve very easily. Scour flea-markets and local hardware dealers for fine-mesh screen, or order it from industrial wire-mesh suppliers. If you happen to find some very fine-mesh screen, you can always check the mesh size with a strong magnifying glass - 80-mesh screen simply means 80 openings per inch. You can mount the screen on a simple wooden frame, or make a great sieve from any 5-gallon plastic bucket that tapers slightly in diameter from top to bottom. With a saber saw, cut the bucket off horizontally 6" below the rim. Slide the lower section down inside the upper section, and mark a line where it protrudes from the bottom of the upper section. Cut it horizontally along this line, and discard (or save for some other use) the bottom of the bucket. The remaining piece will be a plastic band that slips down snugly inside the upper section of the bucket. Cut a circle of screen two inches (overall) larger in diameter than the top of the upper section, so that one inch hangs over the rim. With the screen disc centered on top of the upper bucket section, center the plastic band on the screen disk and press down firmly and evenly, so that the outer edge of the screen folds upwards evenly all the way around, and is trapped between the plastic band and the bucket section. It will help to press downwards with a wood bat or other board on top of the plastic band with one hand, while carefully working “pleats” into the edge of the screen disc all the way around, in order to encourage it to fold up between the two plastic pieces. Once the inner band is pressed down inside the outer bucket section, with the screen edges properly folded upwards between the two sections, use a hammer and a wooden block to tap the inner band down further until it is tightly wedged in place. Apply a bead of silicone caulking to the upper edge of the inner band to seal the crack and lock the band in place.

Shrinkage Ruler: In accurately producing objects that are a specific size after the glaze-firing, such as a replacement lid for a casserole, it helps greatly to have an appropriate shrinkage ruler. Roll out a strip of plastic clay six inches long, immediately trim one edge straight and mark off exactly five inches between two lines along that edge. After glaze firing re-measure the 5" segment with a ruler that reads in decimal fractions of an inch. Compute the percentage of shrinkage by subtracting the fired measurement from 5" (the original wet measurement) and dividing by the wet measurement. For our explanation, we will say that our glaze-fired measurement is 4.4". We subtract 4.4 from 5, giving .6, divided by 5 equals .12, or 12% shrinkage.

The next step is to make a shrinkage ruler with this information. If the shrinkage is 12%, then the fired piece is 88% as large as the freshly made wet piece. To determine the basic unit on the shrinkage ruler, we divide 1" by .88, giving approximately 1.14". This means that something made from this clay that is 1.14" long when wet will shrink 12% in the drying and firing and will be 1"-long after the glaze-firing. On any blank wooden strip at least sixteen inches long (like the back of a wooden ruler), with a permanent marker, lay out and mark increments 1.14" long (or whatever the measurement calculated from the shrinkage of your claybody), and divide them up into halves and quarters like a regular ruler. Label the increments and fractions just as if it were a normal ruler. If you want a plate to be 10 ½" in diameter after the glaze firing make it so it measures 10 ½" on the shrinkage ruler, and it will shrink to an actual 10 ½".

Slip-Trailing Vessels: Standard fine-pointed hair-tint bottles, available from the cosmetics counter in your drug store, work very well as slip-trailing vessels, but the tip is rather short, and better results may be achieved by using rubber ear-syringe bulbs, available from your local drugstore. For fairly thick trailed lines, these bulbs may be used as-is, but for finer lines and effects, you must install a finer tip. The simplest and most effective solution involves the use of standard sports ball-inflating needles, available at any sporting-goods store. The needle-tip has a rounded end, with a hole on the side, and this would be inappropriate for slip-trailing. Straighten out a paper clip, and press it as far as it will go into the needle. With the wire inserted in the needle, cut the needle off just below the side-hole with a pair of wire-cutters. The wire inside will keep the needle from collapsing. Remove the wire, and carefully sand the end smooth to remove any burrs. Cut back the tip of the rubber bulb a little at a time until the broad end of the inflating needle is a tight fit in the bulb. If you are serious about slip trailing, make six or eight of these to accept different colors of slip. In use, the tip is easily cleaned with a fine, stiff wire. Remove the tip when filling the bulb.

The primary disadvantage of this kind of tip is that it cannot be dragged directly against the clay, because it will dig into the surface. To eliminate this problem, purchase some small-diameter IV tubing from a medical supply house, or have someone in the medical professions get you some. There are no needles included, so it should not be a problem to get this item. Cut a 1" length of this tubing, and press it about 1/4" over the end of the ball-inflating needle. This will give you a nice flexible tip. As an alternative, go to an electronics supply store like Radio Shack and purchase some small ***heat-shrink-tubing***. Place a short length over the end of the metal tip on the slip-trailing bulb, so that it extends off the tip at least one inch, and shrink down the entire length by gentle application of heat *above* the flame of a propane lighter.

Sponges: No, you can't make sponges, but at decorating and building stores you can buy high-quality poly sponges that work great. They are durable and last very well, and can be cut with scissors to make custom throwing sponges and sponge-stamps. Don't waste money on cellulose sponges, because they break down very quickly in studio use. For throwing sponges, some potters like thin soft-foam carpet padding - not the dense hard stuff. A small amount of this gives a lifetime supply. For fine sponge work while glazing, small tapered makeup sponges work well.

Sponge Stamps: Random pieces of sponge, or patterned stamps cut from sponge, can be used to apply colored slips, engobes, oxide patinas, or glazes. A finish similar to that on traditional granite-ware kitchen utensils may be achieved by using a piece of coarse scrap sponge to dab white slip over leather-hard gray, blue, or black slip.

Sponge Stick: Don't waste your time and money with those ridiculous commercially-made sponge-sticks with the full-size poly throwing-sponge fastened onto the end. Get a length of 3/8" dowel, and fasten a piece of sponge of the desired size to the end with several wraps of upholstery thread or thin wire, so that the sponge protrudes off the end of the dowel. Make several sizes for different applications.

Pattern Stamps and Roulettes *(pattern rollers)*: Any raised-textured or patterned object or stamp will make an impression in soft clay, but non-porous materials tend to stick to the clay. One of the easiest tools to make, and also one of the most exciting to use, is the bisque-fired pattern stamp. A PDF handout on my website gives a thorough explanation of making and using bisque stamps and rollers.

Throwing Gauges: When throwing multiples of one object, especially in production, it helps to have an adjustable gauge to guide the height and diameter of each piece. For plates and platters the height is easy to deal with, so a piece of dowel with notches cut at the appropriate points will serve as an excellent diameter-gauge. Don't forget to figure the shrinkage of your claybody when laying out the notches.

For a very simple throwing gauge for use on cups, mugs, and teabowls, the Japanese ***tombo*** works very well. Shaped like a lower-case "t", the tombo has a thin vertical member of wood or bamboo, with a small hole bored through it to accept a horizontal stick or dowel. The length of the vertical stick below the horizontal represents the depth of the vessel, and the length of the horizontal represents the width of the rim. In use, the potter holds the *tombo* by the upper end of the vertical member, and lowers it into the vessel to check the depth and diameter. A primary advantage of the *tombo* in comparison to the throwing gauge described below, is that it works well when throwing off the hump.

Western production potters often use an adjustable stationary throwing gauge mounted next to the potter's wheel. To build a sturdy and effective one, search laboratory supply online and purchase an ordinary ring-stand such as is used in chemistry labs, and also the standard ring-stand clamp that allows a horizontal shaft to be clamped to the vertical shaft of the ring-stand. Make sure that the ring stand has a 1/2"-diameter vertical shaft at least 24" long. Get a 24" piece of 1/2" ID steel electrical conduit. The inside diameter will actually be slightly more than 1/2", and it will fit snugly over the vertical shaft on the ring-stand. One inch up from one end of the pipe, drill a 5/16" hole, and weld or braze a 1/4"-20 nut centered over this hole. To the head of a 1/4" by 3/4" bolt, weld or braze a flat washer to form an

easy-to-grasp handle. With the nut and bolt at the bottom end, place the conduit over the ring stand, and screw the bolt into the nut, allowing you to lock the conduit in place over the shaft. Install the ring-stand clamp over the conduit and tighten it at any height. Get a 24" length of 1/4"-diameter brass or steel rod, and grind or sand both ends to a rounded point. Bend a 45-degree angle six inches from one end. Slide the other end horizontally into the ring-stand clamp, and tighten the thumb screw to hold it in place.

To use the device, with a C-clamp, clamp the base of the ring stand to a shelf or table off to the side behind your wheel, with the adjustable horizontal rod extending behind your wheel, with the angled section pointing towards you. By loosening the thumb-screws at the base of the conduit and on the ring-stand clamp, you may adjust the horizontal position, height, and protruding length of the brass rod to correspond to the height and diameter of the rim of the vessel you wish to make. Adjust the gauge so the tip of the rod is actually 1/4" away from the actual vessel-rim, and keep that distance uniform with each bowl or cup you make.

Throwing Stick: When throwing tall narrow forms, such as the neck on a bottle, a throwing stick works very well. This is just a straight stick with a slight bulge on one end. It is grasped in one hand and lowered into the form, and with corresponding normal finger pressure on the outside, the form is lifted and shaped. Cut the profile from ½" hardwood, and sand all the edges round. You can also find tree branches ideally shaped for throwing sticks. Small throwing sticks for making teapot spouts and other small tubes can be made with lengths of wooden dowel. Grind a portion of the shaft to a smaller diameter on the bench grinder, and round off a ball on the end of the shaft.

Trimming Tools: You can easily make band-loop trimming tools, or make replacement blades for existing trimming tool handles. Among the best readily-available blade-stock materials are the flat, thin steel street-sweeper bristles, often found on city streets. They are extremely durable high-carbon steel, a superior material for trimming blades, and yet can easily be bent to the desirable shape. The stainless steel backbone strips found in heavy-duty windshield wiper blades work well, especially those used in trucks and buses. Ask for them at truck-stops or city maintenance garages. Another excellent source of blade material are oil dipsticks from the engine or automatic transmission of a wrecked car. A visit to a wrecking yard could get you a lifetime supply for very cheap. Dipsticks are thin, hard springy steel, but soft enough that they are easily cut and bent to the desired shape. Bandsaw blades with the teeth ground off work well, but you will have to grind part way through and snap them to length, and then heat them with an oxy-acetylene torch to bend them.

With any material other than the bandsaw blade, cut appropriate lengths with wire cutters. Bend each length over a rigid round or square form, depending on the shape you want. For handles, either purchase wooden file handles from a hardware store, re-use handles from worn-out trimming tools, or make your own out of wooden dowel, tree branch, etc., with a 3/16”-hole drilled in one end. Press the two ends of the trimming loop into the hole, just as in the commercially made trimming tool. If the trimming loop doesn't fit snugly, glue it in place, or drive in a small metal or wooden plug to lock it in place.

The steel banding often used on shipping pallets can also be used to make larger band-loop tools, but will require a handle with a larger hole.

Japanese trimming tools, called ***kanna***, are made from flat strap, shaped, and sharpened on a bench grinder, and bent to a right angle on the end. Old kitchen knives may be heated and bent to form such tools. Grind off the tip to create the desired straight or angled end, and sharpen the appropriate edges. Heat the blade in an oxy-acetylene flame, quickly bend an inch or so of the end at a 90-degree angle, and immediately quench it in water with a little detergent in it, especially if the knife has a wooden or plastic handle. The heating will remove the temper from the steel, but the quenching should restore it. The same may be done with heavy commercial bandsaw blades and reciprocating hacksaw blades. You can also make the same kind of trimming tool from rigid steel strapping or flat-bar, but it will not hold an edge as well.

Veneer/Slab Slicer: The traditional Japanese method for slicing uniform slabs is to place two wooden strips of desired slab-thickness on either side of a block of clay, and pull a cut-off wire through the block, using the strips as guides. Lift the block, remove the slab, and repeat as many times as necessary.

If you want to cut very thin slabs, you can make a very effective veneer slicer. See the PDF handout in in the "Tools and Equipment" section of the "Handouts and Information" page on my website.

Wire Frame for Cutting/Blending Clay: Many ceramic artists have a stretched wire permanently installed on their wedging table, to cut and combine clay in the wedging process, and to cut the wedged lumps into smaller pieces. But this wire is often in the way when you want to use the table for other purposes, and it is often an advantage to use such a stretched wire elsewhere in the studio. It is a simple matter to build a portable wooden frame with a stretched wire across the top, which may be clamped down anywhere in the studio. You will need one 16" piece of 2x4; two 12" pieces of 1"-diameter hardwood dowel, white glue; a 16" piece of appropriate wire (see the section above on cutoff tools), and two ½" #10 pan-head sheet-metal screws (auto parts store).

On the flat face of the 2x4, draw a line the full length down the center. 1 ½" from each end along this line drill a 1" hole through the 2x4. Cut two 12" pieces of the 1"-diameter dowel. Drill a 1/8" holes ½"-deep ½" from one end of each dowel. The two dowels are the verticals that hold the stretched wire, and the 1/8" holes are for the screws that anchor and tighten the wire at the top ends of the dowels.

Squeeze some white glue on your finger and smear it in one of the holes in the two-by-four, and around the bottom inch of one of the dowels (the opposite end from the 1/8" hole). Press the dowel into the hole in the 2/4, so that the 1/8" hole at the top of the dowel faces the end of the 2x4. Do the same with the other dowel, so that the 1/8" hole faces the opposite end of the 2x4.

When the glue is dry, install the two screws part-way into the 1/8" holes on the vertical dowels. With a file or saw, cut a shallow groove across the top of each dowel, in-line with the center line on the 2x4. Wrap one end of the wire clockwise several times around one screw and tighten securely. Stretch the wire over the top of the dowel in the groove, across to the grove in the other dowel, and wrap it several times clockwise around the other screw. Pulling the loose end of the wire taught, tighten the screw.

Note that the wire must be wrapped clockwise in order for the wire to tighten properly. Use an appropriate-size C-clamp to attach the device to any table or counter. With time as the wire loosens, you may loosen one screw, pull the wire taught, and re-tighten.