

## All About Coil Construction

Vince Pitelka, 2021

Through history, the most prevalent approach to creating ceramic vessels has been coil-construction. Coil is still the preferred method in many tribal traditions in Africa and the Americas. The form and surface of a coil form is controlled entirely by the maker from start to finish without the influence of mechanical devices, and conceptual and expressive possibilities are endless. Even the most uniform and symmetrical coil vessel communicates the imperfection of humanity and the personality of the maker throughout its form. Too often these qualities are erased in the mechanical precision of wheel thrown forms.

A smooth-turning banding wheel offers tremendous advantages in most coil construction. A sturdy “lazy susan” turntable will work, but you’re far better off with a heavy aluminum or cast-iron ball-bearing banding wheel. An available kick wheel is convenient for coil building, especially larger coil forms.

Coil vessels are constructed by an additive process—building up the walls with long ropelike coils of clay. Start with plenty of well-wedged clay, keep the clay moist, and once you have rolled a supply of coils, store them under plastic and mist lightly with water regularly to maintain moisture and plasticity. I admit a strong preference for hand-rolled coils. With practice you can roll long, uniform coils very quickly by hand without the mechanical precision and shape imposed by the extruder, and you will never be dependent on the availability of an extruder. Considering the time to set up the extruder, prepare the slugs of clay to charge the extruder, and the cleanup time, well-practiced hand-rolling is much faster.

For any flat-bottomed coil form, always start on top of a slab larger than the planned footprint of the form and slightly thicker than the intended walls. Select an appropriate board or bat and place several thicknesses of paper beneath the clay slab. Slap or roll out a flat slab of clay and lay it atop the paper.

**Rolling Coils**—For the best coils, roll on a slightly dampened, porous surface like unfinished wood or a canvas-covered board or table. When rolling coils, spread your fingers apart, and as you roll forwards and backwards, move your hands outwards towards the ends of the coil. Roll with most of the length of your hands from mid palm to almost the tips of your fingers. Lift your hands and bring them back to the center, repeating the process until you achieve the desired length and diameter of coil. Be sensitive to thickness. Back off on pressure when you get to a place where the coil is thin, and apply extra pressure where it is thicker. Don’t be obsessive about the uniformity of your coils, because you can coil build just fine with coils that are a little uneven in thickness. Your coil-rolling technique will improve quickly with practice.

**Use only soft, very plastic clay**, and make sure the rolling surface is damp (not wet). If the coil starts to go oval it is usually because the clay is too stiff or because you are applying insufficient pressure. When this happens, you can bring the oval section up on edge and roll it in short movements to restore it to

round before continuing. A coil that is a severe oval shape can be twisted along its length into a fairly radical spiral, and then will usually roll back to round.

The coil building method described below requires that you carefully consider the intended shape and finished wall thickness, and roll the coils accordingly. As you will see, you will generally build the walls quite thick, and then stretch and thin them using the *rib-and-hand* and *paddle-and-anvil* techniques. With this approach, the diameter of the rolled coils should be at least twice the intended finished wall thickness, and even thicker if you intend to expand the form quite a bit. There are instances when we coil-build to the finished wall thickness with no expanding and little stretching, such as a vertical columnar form. In that case, the coils would be rolled to the intended wall thickness.

The smallest coil forms can have very thin walls, perhaps  $\frac{1}{4}$  inch finished thickness, and larger diameter forms with low walls can easily be as thin. With taller forms no matter the diameter, the walls are normally correspondingly thicker. For very large sculptural forms such as figurative work the walls of the finished piece are often an inch thick.

When planning to expand and stretch the walls in stages as you coil-build, even a small coil pot 6–12 inch in diameter would require coils  $\frac{1}{2}$  inch to  $\frac{3}{4}$  inch in diameter. For a larger coil pot the coils should be  $\frac{3}{4}$  inch to  $1\frac{1}{4}$  inch or more in diameter. Once accustomed to coil construction you will anticipate the size and type of form and make coils of an appropriate thickness. As you will see, the wall is thinned considerably as the coils are smeared in place, and then further when using the *rib-and-hand* or *paddle-and-anvil* methods. Using these methods, a thick cylindrical coil form may be thinned and shaped to a broad volumetric form. It is essential that you anticipate these things in determining the size of coils to be used.

When making quantities of coils, simplify things by setting your block or log of clay on a table lined up away from you, and pull a cutoff wire through to cut the block or log into even sections lengthwise. Hold one finger of each hand against the table surface to accurately control the height of the cutoff wire. A 4-inch extruded pug of clay can be cut into quarters lengthwise. A 25-pound block can be cut into three thick slabs lengthwise, flipped on its side, and cut again, producing nine square strips. In either case, before attempting to roll coils from one of these strips, pick it up and twist from both ends to introduce a fairly radical spiral and then it will roll easily.

In preparation for coil building a series of large forms, I often roll several hundred pounds of coils ahead of time. I place them on plastic, wrap them completely, and mist the coils frequently as I use them, always keeping them covered with plastic. If you attempt to coil build with clay that has stiffened even slightly, the joints between coils will likely crack during drying or firing.

### ***Building a Coil Form***

In graduate school at UMass-Amherst I was lucky to be studio neighbors with Sherinatu Fafunwa-Ndibe. Growing up in Lagos, Nigeria, Sheri was fortunate to learn traditional coil construction from Nigerian tribal potters, and I was fortunate that Sheri is such a patient and thorough teacher. As described

below, the method is adapted to the tools and materials we are familiar with, but otherwise the technique is as Sheri taught it to me. Potters and sculptors from many cultures have perfected coil construction over thousands of years, and we would be foolish not to follow these tried-and-true precedents.

For the base slab, it works well to simply slap out a disk of clay, but in certain situations you may wish to roll it with a rolling pin. Score and slurry the desired footprint on top of the slab, and press a single course of coil in place, squeezing the coil and pressing downwards firmly to eject excess slurry. Once the coil is in place and well joined, remove all excess slurry inside and outside the coil and then pinch the coil with your fingers to raise it vertically into a low wall, maintaining an appropriate wall thickness for whatever size vessel you are planning.

***As long as you are using coils of soft clay and joining to soft clay, do not score or apply slurry as you smear successive coils in place*** following the directions below. If you leave the form for a period of time and the walls begin to stiffen even slightly, then you must score and slurry before adding the next coil in order to get the strongest joint between stiffened clay and the new coil. Remember that the objective is to interlock the clay platelets at the joint, and efficient smearing does a far better job than scoring and applying slurry. On that first joint against the base slab, and when attaching the next new coil atop a stiffened wall, there is no way to efficiently join the coil without scoring and slurry.

Using this method, you are always adding coils and wall height to the opposite edge from where you are sitting or standing. Drape the coil from one hand so that just a few inches of the end of the coil rests on the vessel wall on the far side of the form. With your fingers held together, place your hand vertically flat against the outside of the form, fingers pointing downwards. With your thumb of the same hand, aggressively smear the coil downward on the inside of the wall. Keep moving along the wall, smearing downwards, lowering the coil onto the wall a little at a time. Do not lay any length of the coil atop the wall before smearing it in place, because that will result in a radical expansion in diameter, which can quickly get you in trouble. Instead, lowering the coil onto the wall just a bit at a time allows you to build upwards as you smear the coils in place, without excessive horizontal expansion.

Rotate the form on a banding wheel or turntable while working. If you are right-handed, lower the coil onto the far edge of the form in a counterclockwise direction with your left hand and smear the coil into place with your right hand, and just the opposite if you are left-handed. Smear aggressively, so that each smear covers at least  $\frac{3}{4}$  the height of the coil below it.

When you come around to the point where you started a coil, just keep adding and smearing and overlap the end. Don't work your fingers against the outside. Just keep them vertical flat against the far outside wall to provide backup pressure to accommodate the smearing force of your thumb on the inside. As you will come to see, the consistent position of your hand on the outside plays a big part in controlling the initial form as you build upwards.

The primary advantage of this technique is that you have the choice of building thickly and then expanding the form once you have achieved some vertical height, or smearing considerably more aggressively to get close to the finish wall thickness desired. In either case, the rib-and-hand and paddle-and-anvil techniques described below will allow you to resolve and compress the form and surface, and you need not worry about the subtleties of shape at this point.

How much height you add in one stint of coiling depends on the amount of upwards and outwards stretching and forming you plan to do. For a large coil vessel where you plan to expand outwards considerably, add three to five coils at a time before proceeding. If you want to work vertically and end up with reasonably thin walls, or if you are reducing the diameter of the form, then add only a few coils before forming and stretching as explained below. In either case, if you get to a point where you are closing in the upper portion of the form, add only one or two coils before forming and stretching.

Some coil builders orchestrate much of the final form while building rather than by stretching and paddling, and the position of your hand against the far outside wall helps to control this. The instructions above say to keep your hand in a vertical position against the outside of the form while smearing the coils together with the thumb, but you can tilt your hand outwards if you wish expand the form while adding coils, or tilt it inwards to decrease the diameter.

Do not worry about cosmetic surface details during this process. Smearing aggressively will leave a rather ragged inside surface appearance, but that's just evidence of a well joined wall.

Once you have added a series of coils as described above, use the rounded end of a completely rigid wood or plastic rib (never rubber) to smear the coils together on the outside, supporting the form with your hand in a corresponding position on the inside. Use upward diagonal strokes, with the rib tilted steeply enough to smear without scraping away much clay. Vertical strokes can pull the coils apart, and horizontal strokes simply conceal the joints without improving the connection. Upward diagonal strokes work best. If you have added only a few coils, you will smear them together on the outside in one pass around the vessel. If you have added more than two or three it will take several successive passes around the vessel to get all of the newly added coils smeared together. Be thorough. When done, you shouldn't see any remaining divisions between coils. This process does leave a fairly ragged surface on the outside, and it is usually best to deal with it later. If it bothers you, smooth it with a flexible rubber or metal rib.

Next, using the broad surface of a rigid, smoothly rounded wood or plastic rib, blend the surface smoothly on the inside of the form, evenly supporting the corresponding outside profile with your hand.

### ***Expanding and Shaping a Coil Form with the Rib and Hand Method***

After adding a series of coils be sure you have smeared them together on the outside with upward diagonal strokes using the rounded end of a rigid rib and smoothed the inside with the broad edge of a rounded rigid rib. Once that is done, place your hand flat against the curved surface on the outside with your fingers horizontal, and work the inside with the broad curve of a rounded wood rib, smearing

either horizontally (the coils are already well joined) or diagonally upwards in repeated strokes, moving around the circumference of the piece along horizontal bands. Depending on how you balance the pressure of the rib on the inside versus the corresponding pressure of the hand on the outside, and the direction of the strokes, you can either stretch the walls upwards while retaining the same shape, or expand the form outwards to achieve a swelling volumetric shape. In either case, after you have gone around the circumference of the piece once or twice, switch hands and work on the opposite side of the piece, still with the rib on the inside and the hand on the outside. When you do this, the strokes will be in the opposite direction, which helps maintain a smooth curve and even wall thickness, and it further strengthens the smeared coil connections inside the wall. Try to get close to the desired shape. If the form expands a little too much, you can use the rib on the outside and carefully bring it back inwards. If the form starts to buckle badly when you try this, chalk it up to experience and start a new one.

It takes experience to know whether you can add more coils right after completing the above process without leaving the form to stiffen a bit. If the walls so far feel structurally secure, especially if you are building fairly vertically, and as long as the upper edge of the walls still has the consistency of fresh moist clay, then you can continue smearing coils in place. As soon as the form starts to feel soft and floppy, especially if it is flaring outwards or narrowing inwards, it is best to let it stiffen up before proceeding.

#### ***Leaving a Partially Completed Coil Form to Stiffen Before Adding More Height***

With any but the smallest coil forms, you will need to proceed in a series of stages, letting the form stiffen in order to support the weight of subsequent coils. As soon as you build the walls to a point where you need to let it stiffen, pinch the very edge of the rim to sharpen it, like an upside down “V” cross section, and set the form aside.

If the form is fairly large and the lower portion has already stiffened considerably, wrap that section in plastic. To speed things up and proceed right away, gently stiffen the newly added sections with a heat gun or torch.

#### ***Resuming Coil Construction After the Lower Portion has Stiffened to Soft Leatherhard***

Once the form has stiffened enough to support more coils, score both inside and outside surfaces of the sharpened edge down about ½ inch, and if there is any flat surface on top score that as well.

Generously apply a bead of slurry to the upper edge, and then lay a single continuous course of fresh coil in place atop the bead of slurry. Gently paddle the coil straight downwards with your hand or a wood paddle to push it down slightly over the sharp leatherhard edge, with an even amount of the coil inside and outside the form. Do not paddle so aggressively as to cut the coil in half lengthwise over the sharpened edge. Once you have paddled the coil down, pinch the coil along the far side of the form with your thumb on the inside and fingers on the outside and rotate the form to work your way around the circumference. As you do this, the action of your fingers should push the clay downwards slightly both inside and out over the scored area with the bead of slurry advancing in front of the clay.

After pinching all the way around, remove all excess slurry with your fingers or a barely damp sponge. Continue pinching the coil until you have thinned the added coil to the thickness of the wall beneath. Smear downward with a rigid rib inside and out to blend the joint and remove any residual slurry. After that, you can resume adding coils by the standard method, lowering them in place and smearing down with your thumb on the inside.

### ***Controlling Drying as You Proceed***

While coil building in stages, the lower sections naturally stiffen up as you proceed. Avoid letting the discrepancy become excessive. Make sure each successive portion stiffens enough to support the added wall above, but do not allow any part of the form to stiffen more than that until you are done. Spray the lower wall periodically with water in a spritz bottle, and if necessary, wrap the lower portion in plastic while you are building and shaping the upper part. When you leave your coil form for any significant period of time always wrap the whole form in plastic. With a large coil form, condensation inside the plastic can cause structural collapse unless you drape the form with thin cloth like bed sheet material before covering with plastic. This will diffuse condensation and encourage even drying.

### ***Closing the Rim of a Coil Form***

As mentioned above, when you wish to narrow the neck or rim of a coil form you can tilt the outer supporting hand inwards as you smear coils in place, which in effect steers the direction of the coils. The form can also be closed very effectively with a rib. Support the inside with your fingers under the rim and smear inwards over the top surface of the rim with a rigid rib, rotating the form continuously. As long as there is sufficient thickness in the rim, you can close the opening as much as you wish by this method, but monitor the thickness carefully. If the rim seems to be getting thinner than the walls below, add another coil and continue smearing inwards. It will be a bit awkward smoothing the surface on the inside when the upper body has curved inwards considerably, but it's worth it taking the time to do it well. For this task, the edge of a round-headed paddle works well in place of a rib.

### ***Using the Paddle and Anvil Methods to Resolve Shape and Surface***

Once the initial coil form is roughed out and stiffened to soft leatherhard, some coil builders choose to thin the walls and resolve shape using the paddle and anvil method. The paddle used in this process is vaguely like a Ping Pong paddle but  $\frac{3}{4}$  inch to 1 inch thick of hardwood stock, with a longer handle and smaller head. Traditionally the anvil is a smoothly rounded river stone or solid hardwood shape, but bisque fired anvils work better because the porous surface doesn't stick to the clay and you can make any shape you want. Rough shape any clay body to a solid, rounded form 3–4 inches across, varying the curvature from one side to the other to give several choices in use. As the anvil begins to stiffen, poke plenty of holes all the way to the center with a needle tool to prevent the form from blowing up in the bisque firing. When leatherhard, trim the surface with a Surform tool to give uniform curves, but unless you need an absolutely smooth interior on your forms, leave the Surform texture because it helps separate the clay and leaves a very subtle but pleasing texture.

Hold the anvil against the inside wall of the vessel, and in the same spot gently beat the outside with the paddle. Move the anvil and paddle as desired to thin the walls and alter the form. Where there is a

depression in the outside of the form, push outwards with the anvil as you are paddling, or place your hand over the depression and gently tap outwards with the anvil. The paddle can also be used by itself on the outside of a form to resolve shape, eliminate high spots, decrease overall size, or create paddled facets.

Note that the rib and hand method is best used while the clay is very soft and plastic, and will likely cause severe cracking if attempted even at soft leatherhard. The paddle and anvil method does not work when the clay is very soft because the paddle sticks to the surface and the impact causes vibration and oscillation of the whole piece, often leading to structural failure. All radical alteration of shape should be done with the rib and hand when the walls are still soft. Minor correction and resolution of surface with the paddle and anvil or just the paddle can continue into medium leatherhard stage.