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About Clay-Mixing – Advantages of the Slurry Method

Making Plastic Clay – Shortcomings of Mechanical Mixers

Most of us in studio clay are guilty of irrational fascination with tools and machinery, and assume that accomplishing any task with a machine or fancy tool is somehow better than doing it by hand or with a simpler or more-primitive tool. That is often not the case, and in many situations upgrading to fancier tools and equipment is a poor use of funds.

In most academic settings and large studios, the most common method of mixing "ready-to-use" plastic clay is with mechanical "shear" mixers such as the Bluebird, the Soldner, or the mixer-pugmills like the Peter Pugger or Bailey. These mixers blend the clay by a mechanical shearing action that forces the clay around and through moving or stationary paddles or bars. They are all very high-quality machines, and can serve to mix good clay, but the challenge with any such mixer is that we are told to add just the amount of dry materials and water to produce a claybody that is supposedly ready-to-use, but that is an unrealistic expectation. No matter how-well we designed the claybody, a shear-mixer simply does not thoroughly wet the particles, and that is one of the key requirements for improving plasticity in newly-mixed claybodies.

Claymixers are also very expensive pieces of equipment, and require significant dedicated space for their storage and use. Considering all of these things, a mechanical claymixer is often a poor choice when the objective is to achieve the most plastic, workable claybody, especially with porcelain bodies.

Making the Most of a Mechanical Mixer – Wetting the Particles

If your only alternative is to use a mechanical shear-mixer, you can greatly improve the critical wetting of the clay particles if you start with the full measure of water, add all the clays, and leave the mixer running for at least an hour. After that wetting period, the feldspar, flint, talc, sand, grog, or other non-plastic materials can be added and the mixing completed quickly. There is no problem wetting the non-plastics, because they do not absorb moisture and you only have to wet the surface. That happens easily, because they are like giant boulders compared to the sub-microscopic size of clay particles.

Start with a good Claybody Recipe Featuring Proper GPD

Always examine any claybody recipe under consideration, and in particular consider the number of different raw clays included and the nature of each raw clay. The most plastic raw clays are the finest in size – the ball clays and bentonites, but excessive content of very plastic clays will cause shrinkage so extreme that the claybody will be unusable. The essential concept in designing any plastic claybody is ***distribution of particle sizes*** or ***green packing density*** (***GPD***), which refers to the practice of including multiple particle-sizes of clays, creating far more contact points between particles and far less voids. Such a claybody will feature good plasticity, greater working structure, less shrinking in drying and firing, and greater bisque-fired strength. Sand and grog increase working structure, but if you want a

smooth, grit-free claybody featuring greater working structure and less shrinkage (especially for throwing large vessels or for handbuilding), consider adding 100-mesh kyanite or molochite. This further increases GPD and reduces shrinkage without negatively affecting plasticity.

The Slurry Method – An Inexpensive and Highly Efficient Clay-Mixing Option

In many cultures, clay was and often still is mixed as a thick slurry that is then stiffened to plastic consistency for use. This offers the advantage of producing highly plastic clay, because the particles are wetted much more thoroughly than with any mechanical claymixer that supposedly produces ready-to-use clay. It offers the additional advantage of very low cost in comparison to commercial claymixers. For efficient blending of the slurry, a drill with an impeller-mixer is ideal. For volume mixing in plastic barrels, purchase a heavy-duty half-inch electric drill and a large impeller-mixer with a ½" shaft.

Dry-mixing the raw materials ahead of time helps, and this is easily accomplished in a cardboard shipping drum with a tight-fitting clamp-on lid. Cut several strips of wood slightly shorter than the height of the drum, and screw them in place vertically inside the drum with short drywall screws coming through from the outside. Place all the dry materials in the drum, clamp on the lid, tip the drum over, and roll it around on the floor. The strips of wood will agitate the dry materials, insuring efficient mixing.

Measure out water representing 45% of the dry materials weight (one gallon = 8 lbs.), and place it in an appropriate heavy-duty plastic barrel. Add the dry materials, mixing frequently, and mix thoroughly when all materials are added. This will produce slurry which is about 30% water. This slurry should be thick enough to mound up in rows for stiffening, but ***you should always let the slurry sit for at least 24 hours, re-mixing it periodically with the drill-mixer***.

Keep in mind that every claybody is different, and it is an excellent idea to have some extra dry-mixed claybody on hand, so that you can thicken the slurry a little if it seems to thin to mound up in rows. You would want to do this when you first mix the slurry, before giving it 24 hours to thoroughly soak all the particles.

Needless to say, the same heavy-duty drill-mixer and drying process can be used to mix reclaimed scraps which have been slaked down in water.

Stiffening the Slurry

The disadvantage of this method is that the slurry must be stiffened to plastic consistency, which always requires special accommodations of time and space.

Stiffening with a Filter Press

In large commercial clay businesses and facilities they sometimes us a filter press, a very large and expensive piece of equipment. The slurry is dispensed into flat, heavy canvas bags that are lined up in the filter press, and hydraulic pressure compresses them and expels the water through the canvas, resulting in flat, plastic clay wafers that truly are ready-to-use.

Stiffening in Linear Mounds

There are a number of different choices for stiffening slurry. As mentioned above, after the slurry sits for 24 hours it may simply be mounded in rows on a concrete floor or a plastic-covered table. Of course it will dry faster along the peaks and edges, and as long as you catch it in time, a good wedging will take care of this. Potters who use this method in volume often run the stiffened clay through a pugmill, preferably a deairing mill, in order to give clay of uniform water content.

Stiffening on Plaster Slabs

For high-volume recycling some potters prefer to stiffen their slurry on large plaster slabs. To reduce the chances of plaster chipping along the edges of the slabs, pour the plaster in sturdy permanent wooden frames. Such slabs should always be at least 1 ½"-thick, in order to have adequate absorbing capacity. For 1 ½"-thick slabs, rip 2x4s down the center, cut appropriate lengths, and screw them together to make the exterior frames for the size slabs you want. After screwing them together, use a router to cut a ¾" by ½"-deep groove down the center of the inside edge of each frame so that the plaster slab will be locked in the frame.

Plaster slabs can get very heavy, so don't make these slabs larger than 24" square. Lay the wood frames on a level smooth-surface table or floor, and seal around the outside edge with clay. Coat the table or floor surface with mold soap. Calculate the displacement and mix an appropriate amount of plaster, and pour the frames full. When the plaster has cured adequately, slip a putty knife under the edge to lift them from the table. Dry them thoroughly before use. These bats can be stored vertically in any convenient place, and spread out on a workbench or the floor when you need to stiffen slurry.

Stiffening in Canvas Bags

An interesting alternative for stiffening slurry is to make long, heavy sewn canvas bags, fill them with slurry, and hang them over a sturdy horizontal pole. Or, for those inclined to improvise, an equally-effective approach is to take old canvas or denim jeans and sew the legs shut at the bottom, hang over a sturdy horizontal pole, and fill both legs with slurry. Don't laugh. It sounds strange and looks really funny, but it works great.

Stiffening in a Brick Trough

In dry climates, a great way to stiffen slurry is to build a temporary frame of bricks or cinderblocks outside in the sunshine or inside if there is available space, line the inside with a plastic tarp, and fill with slurry. In wet climates this obviously doesn't work outside. The traditional British method for stiffening slurry was to build a long brick trough with a flue passing beneath it, and a firebox at one end and a chimney at the other. The trough is filled with slurry and a fire built in the firebox and maintained long enough to stiffen the slurry.

Stiffening in Plastic Buckets

Aging always improves clay, so if you are in no particular hurry, you can transfer the slurry to five-gallon buckets lined with plastic trash bags. The reason for the trash bags is that it is difficult to rake plastic clay out of a bucket or barrel, but once the clay has stiffened, you can

turn the bucket over and the clay in the trash bag will slip out of the barrel and will be easy to store and use.

Drape a piece of cloth over the top of each bucket to keep dust and bugs out, and leave the buckets in a warm, out-of-the-way spot. The clay will stiffen over a period of weeks or months (depending on warmth and humidity), and the result will be a very plastic claybody (assuming that you started out with a recipe featuring proper GPD).

Advantages of a Deairing Pugmill

Keep in mind that air content or air voids are the enemy of plasticity in any claybody, especially porcelain bodies. Thorough wedging will eliminate all air, but over time wedging can cause Carpal Tunnel Syndrome and other wrist or arm problems. If you are a serious potter who uses the slurry-mixing method, consider getting a small vacuum deairing pugmill like the Bluebird 440, the Axner New Wave, or the Venco 3" deairing mill. Any one of these is at least a $2500 investment, but it will last a lifetime, give you the very best plastic clay, and you will never have to wedge clay.