PPP: Processing Clay the Easy Way

by Jim Bailey
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A new all-in-one mixer/pugmill makes easy work of traditionally labor-intensive clay mixing, recycling and pugging processes.

Above: This scrap clay would ordinarily have to be slaked to be reused. With the all-in-one mixer/pugmill, it can be added to the machine without any prior preparation.

Few pottery producers would say that processing clay is the favorite part of their job. For many hobbyists and small producers, the easiest way to avoid this task is to buy pre-mixed, ready-to-use clay at the nearest pottery supply shop. But in every successful potter's career, there comes a point where in order to grow, you have to begin evaluating every stage of your operation to ensure that it is as cost-effective as possible. In many cases, growing beyond a few pieces per month to dozens or hundreds requires that you mix, recycle and pug your own clay so that you have complete control over the entire process.

Historically, processing clay has required a separate mixer and pugmill. To complete the mixing/pugging process, potters had to incur the cost of purchasing two separate machines and establishing two electrical hookups. They also needed a large amount of space to accommodate both machines, and they had to be prepared for the back strain and labor-intensive process of transferring the clay from one machine to the other.

Recently, a new line of all-in-one mixer/pugmills* has been developed to overcome these challenges and provide an efficient solution for clay mixing, recycling and pugging. With these new machines, potteries and schools are discovering that processing their own clay can be quick, easy and cost-effective.

*The Bailey MX and MXP Series, supplied by Bailey Pottery Equipment Corp., Kingston, N.Y. The MXP Series provides both mixing and deaired pugging functions. In the MX Series, which was designed primarily for schools where students wedge their own clay, the deairing function has been eliminated.

The Traditional Clay Mixer

Clay mixers are used to mix clay from scratch, reconstitute (reclaim) clay scrap or adjust premixed clay that might need additional moisture. Because of the limitations of the mixing action, most studio-sized clay mixers tend to be very restricted in their capacity to directly recycle clay that has lost sufficient moisture and can no longer be considered "plastic." In other words, if the mixing blade can't cut through it, it won't mix.

As a result, scrap clay often requires an extra step of slaking before it can be mixed. Slaking is a cumbersome process that requires the clay to be dry and in reasonably small sections so that it will dissolve readily when it is immersed in water-filled "slake buckets." In addition to the time required for slaking, slake buckets take up valuable studio space, and the process of

digging out the wet slop and transferring it to the mixer so it can be balanced out with dry powder is very time- and labor-intensive. These extra steps also tend to create a mess and generate dust.

Removing clay from a mixer is also not an easy task. Regardless of the type of mixer used, the operator has to either bend over to lift the clay up from where it is dumped, or dig it out of the mixing drum. This puts a lot of strain on the operator's back and requires a significant amount of time. The mixed clay, whether it has been freshly mixed or recycled, then has to be deaired before it can be used, requiring still more valuable time.

In an effort to preserve their wrists, prevent carpal tunnel syndrome and save time, an increasing number of production potters have turned from wedging to pugmills for the final deairing and blending of the clay. However, while pugmills are useful for softening clay that has become a little too hard to process, by no means do they perform the role of mixing. It is simply not practical to add powder to a pugmill to stiffen clay.

Some potters recycle their scrap clay by returning it to slake and then spreading the slake onto plaster to draw out the moisture. However, as discussed previously, the slaking process is very time consuming and takes up studio space. For this reason, the plaster/slaking approach for recycling has been abandoned by many potters, and a large amount of perfectly good clay scrap is often wasted for lack of an efficient reclaiming process.

The Appeal of the "Combo" Machine

The idea of combining the clay mixing process with pugging in one machine has long held a significant appeal. One combined machine would require less studio space and eliminate the extra handling steps of getting the clay from the mixer to the pugmill, saving both time and money.

The late 1960s saw the first commercial attempt to combine a mixer/pugmill in what was called the "Walker," which consisted of a single auger pugmill with a long "V"-shaped hopper for mixing that fed into a pug barrel. Unfortunately, this machine was labor-intensive to use and not very effective at either mixing or pugging. Clay typically had to be run through the machine several times before it was suitable for use.

The new all-in-one mixer/pugmill overcomes this challenge by using two auger shafts in the mixing chamber, one of which is longer and reaches into an extended pugmill barrel, where a dedicated vacuum chamber and shredding screen are located. The two mixing augers with paddle blades mesh together in opposing directions as they mix (similar to an egg beater), which greatly increases the efficiency of the mixing action and reduces the mixing time. With

the two intermeshing blades, subdivision, shredding, circulation and diffusion of the clay are performed quickly during the mix cycle.

This twin-blade mixing action is so efficient that clay in any combination (powder, wet slurry, bone dry, hard chunks, semi-hard chunks) can be efficiently reconstituted in just minutes. This is very different from typical mixers, where you would never consider putting in dry chunks of clay (large or small) from broken greenware or trimmings into the batch. In fact, one variation of the new machine** can be used to mix a perfect batch of clay using just dry greenware, trimmings and water. Within 20 minutes, the entire batch will be thoroughly mixed and pugged out, ready to use for new pottery.

The new system eliminates the need for slaking and the associated mess, labor and storage buckets. Eliminating the slake also eliminates the magnitude of dust that is often created when trying to balance the consistency in a mixer. Furthermore, reclaimed clay can be run through the process daily rather than accumulating in the studio. Users have found that it's satisfying to know that any scrap is being turned back into cash instead of thrown out.

**The MXP series.

Realistic Mixing Expectations

The two mixing augers mesh together in opposing directions as they mix, which greatly increases the efficiency of the mixing action.

Time savings is a major factor in the increasing popularity of these new all-in-one mixing/pugging machines. The larger model is capable of producing a finished, pugged batch of approximately 95 lbs of wet clay in about 20 minutes (not including the time required to measure and load the materials into the machine). After loading, the unattended mixing time is about 12 minutes. The actual labor time required to mix and pug three batches equaling 285 lbs would therefore be approximately 30 minutes. Since the mixer/pugmill operates unattended after loading, the operator is free to pursue other important tasks. Additionally, no effort is required to pug the clay since the system is self-feeding, and no time is required for cleanup. Any clay that remains in the mixing chamber after pugging can be left for the next batch. And because the clay pugs out at waist height, the potter does not have to bend down when removing the finished pugs.

Compare this to a conventional mixer capable of mixing a 250-lb wet batch. The mixing time

would depend on the mixer and material formulation, but let's use a conservative estimate of 15 minutes. Removing the materials after mixing would take an additional 10 to 15 minutes of considerable effort, while transferring the clay to a pugmill would require about five minutes. Running the clay through an 800-lb-per-hour pugmill would take about 20 minutes, and the necessary cleanup of the mixer would take about 15 minutes. In total, mixing 250 lbs of wet clay (not including measuring and loading time) with a conventional mixer, cleaning the mixer, and then pugging the clay in a separate pugmill would take approximately 40 minutes. Using a mixer capable of mixing smaller 150-lb wet batches per load would add 15 minutes, and a pugmill rated for 400 lbs per hour would add 20 minutes, bringing the total mixing and pugging time to a labor-intensive 1.5 hours.

Even though the new all-in-one mixing/pugging machines cycle smaller raw batches, the actual time and labor involved based on the same accumulated output-including pugging-are significantly lower. And as previously explained, the time savings when mixing recycled scrap is even more dramatic.

One other benefit that many schools and production potters find appealing is that the new mixer/pugmill does a better job of reducing dust exposure during mixing. Once the hopper is closed, no dust will escape during the mix cycle. Because the hopper is relatively small compared to a typical mixer lid, it is easier to create the appropriate source/capture venting for control of the transfer of powdered materials.

Optimized Clay Processing

Mixing, reclaiming and pugging clay doesn't have to be a time- and labor-intensive process. With advances such as the new all-in-one mixer/pugmill machines, pottery producers can gain the optimum level of control over their clays with a minimum amount of effort.

About the Author

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SIDEBAR: Using an All-in-One Mixer/Pugmill

When using an all-in-one mixer/pugmill, it is important to fill the barrel to capacity. The blades and walls of the mixer work together to mix and circulate the clay in the mixing chamber, and partially filled barrels will not mix or self-feed efficiently.

Once the mixer has been filled and adjusted, the operator simply locks the lid in position to initiate the mix mode. The mixing cycle is completed in about 12-16 minutes. If the lid needs to be lifted during mixing, a safety hatch with a lockout switch automatically shuts off the motor and stops the auger rotation. To pug out the clay, the operator simply stops the mix

cycle and pushes the pug switch, which reverses the direction of the auger rotation and causes the clay to automatically discharge from the machine within several minutes. During pugging, the operator manually initiates a vacuum switch to deair the clay in the vacuum chamber section on the pug barrel. In a 95-lb batch, only 4 to 6 lbs of clay will be left in the mixing chamber after pugging. There is no need to clean this out—it can be left in the machine for another batch. When the machine is not in use, the operator should close off the pug nozzle with the rubber cap and close the hopper lid to seal in the moisture.