Water-Etching:

A Well-Kept Secret.

This was the original draft of a submission to "Pottery Making Illustrated" sometime in 2007, eventually published under the title "Adding by Subtracting". Some of the included photographs were omitted in the printed version for reasons of space, but they're still included here to help make the explanations clearer.

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Pottery at Old Toolijooa School

Some time last year, on a visit interstate, I bought a delightful porcelain pot with a delicate raised pattern on the outside. Carved with infinite patience, or so I thought. Not at all, the potter told me. It's water-etching... and I was given a one-sentence outline of how it's done. Use wax emulsion to paint a design on the unfired pot, then spray with water.

Back home in the workshop, I've had time to follow up this idea, and it has opened up a whole new field of possibilities. Nothing found on the internet. Nothing known by various other experienced potters of my acquaintance. How could this wonderful technique have remained a secret for so long?

So, what do you do? This photo shows what you can expect, once you know the secret, and it's so simple really.

- Throw a suitable pot, using a smooth fine-grained clay. Let it dry.
- Use wax emulsion and a fine brush, to paint a design on the pot. Food dye in the wax makes it easier to see where you've been.
- Invert the pot and suspend it on some kind of pedestal, then apply a fine spray of water. The idea is to wash away the clay where it's not protected by wax.

Be prepared for some pleasant surprises. Firstly, the process is so quick. The unprotected clay washes away fast, and it's possible to etch down to a depth of a millimetre or more in less than a minute. And next, the etching process follows the wax outline precisely. You might expect the water spray would undercut the wax, just as sandblasting undercuts a stencil. Not so! The pattern remains crisply defined. Even thin fine lines survive undamaged. Magic!

You might also expect the constant water spray to reduce the unfired clay to a soggy mess, but this hasn't been a problem, even with thinly thrown delicate pots. If you work swiftly, the whole procedure takes only a minute or two. The lower edge of the inverted pot will be first to soften, so you'll need to gently blot away the water droplets with a soft sponge. Warm air from a hair dryer will speed up the return to crisp dryness.

When the pot is dry again, or nearly dry, you can pick it up and refine the details if necessary. Notice the little stylized veins in the leaves, in the photo? And in another photo, see the fish scales and the gill slit, and the little lines on the tail and fins? These details are easily added by hand, with a pointed tool, after the water-etched pattern has dried. These additions don't take long. The water-etching step does all the hard work.

There will be times when you want a “basket weave” effect, where one strand of the pattern has to pass behind or in front of another. This photo shows an example, where the fish’s tail is behind one strand of weed, but the head is in front of another. No problem at all... just use a pointed knife to scrape away a little clay where it matters.

Not satisfied with the outline, where one of your leaves has a bumpy bit you would rather not see? No problem. Just scrape it away. It’s easy to make minor repairs. Just don’t get carried away.

Having discovered that the water etching process is so precise and so simple, I tried adapting it to another idea. This time the freshly made pot was sprayed with a thin coat of dark slip (10% red iron oxide), and allowed to dry. Then, as in the original process, a design was painted on using wax emulsion, and the pot was suspended upside down on a pedestal. This time the idea of the water spray was to wash away the brown slip, exposing the white clay beneath.

For this pot, the chosen glaze was one we know as “Cone 10 Clear”, a very transparent coat which does not obscure the pattern beneath.

Hmm. That was fun. Let’s do it all again, this time using a blue slip.

This pot has been given a smooth even coat of blue slip (1.5% cobalt oxide), just enough to cover the area where the design will go. The simple plant motif has been painted on, using wax emulsion heavily loaded with dye so the narrow brush strokes are easy to see. Then the pot is supported over a platter, on a banding wheel, ready for the water-spraying step.

Here is the pot after the water-spraying. From the puddle in the platter you can see how little water is needed, only about 500 millilitres. It's milky white by reason of the clay washed down from the pot as the water etched it away. (Don't be tempted to return this water to your clay-slops bucket... remember it's loaded with cobalt oxide).

If you've been quick, the pot at this stage will be damp but not soggy wet. Just run a sponge around beneath the rim to blot up the drips there, then dry everything off using a hair dryer.

In close-up, you can see that the edges of the pattern remain sharp. Little wobbly bits on the edges can be given a cosmetic touch-up with pointed tool, if it seems necessary. And of course, extra details like leaf veins can be drawn now. It's better to do these while the pot is still a bit damp, so the scriber makes a smooth clean line without breaking out little chips and crumbs.

This photo shows the pot as it emerged from the bisque firing. The blue colour now is due to the cobalt slip alone, not to the blue dye.

Finally, here's the finished pot, again using the "Cone 10 Clear" glaze.

The wax emulsion available here is milky white, and it's easier to see the brush strokes if some dye is added. Food colouring is OK. Or better still, some of the ink from an inkjet printer cartridge.

It occurred to me to wonder whether the water etching process would be better or quicker on a bone-dry pot, or on a leather-hard one. Try it and see! A flat disk of clay was allowed to dry until leather-hard, then a pattern of lines and a leaf shape was painted on using wax emulsion. The disk was cut in half, then one piece was allowed to dry completely, while the other half was stored in a plastic box, still damp. Finally both halves were re-united and sprayed together. Here's the result.

Surprise,surprise! It doesn't seem to make any difference. Given the choice, I'd choose the leather-hard stage, since it's less likely that the pot would be stressed when the freshly wet outer surface swells and strains against the still-dry interior.

This photo, close-up, shows what you can expect if there are bits of grog or grit in the clay. Nasty scratchy bits are left sticking up, where you would rather have a smooth unblemished surface. Here is a reason to use porcelain, or at least a very smooth clean stoneware. Grit in the clay is bad news. Smooth is beautiful.

What kind of water spray, you may ask? I used the ordinary gravity-feed spray gun kept here for applying glazes, but wound up the air pressure to about 100 psi instead of the usual 40. It was adjusted for a fine wide-spread spray, and held about 50 mm from the pot. All of this was done on a rotating turntable, in a spray booth. But you could do it outside on the lawn, with a garden hose adjusted to a fine mist. Truly, it's as easy as that.

Of course, you could have produced these simple stylized leaf designs by brushing on the coloured slip directly, without using the water-etching process. But could you achieve the same uniform dense coat at every brush stroke? What happens if your brush runs out of pigment half way along a stem? Painting the design with wax emulsion is much more forgiving, if (like me) you find fine brushwork difficult. And as well, there's the extra appeal of having the design stand out in low relief above the smooth surface, not just painted on.

There. Now you know the secret of water etching. Take the idea and run with it!

Glaze Recipe: Cone 10 Clear

Potash feldspar	15
Whiting	19
Ball clay	28
Silica	30
Talc	7

Cobalt Blue slip.

A good proportion is 1.5% cobalt oxide "weight over weight", that is 1.5 grams of oxide for every 100 grams of dry clay. Just collect the slip from your wheel tray after you've thrown a few pots. Thin creamy slip contains about 50% solids by weight, so you'd use 1.5 grams of oxide for every 200 millilitres of slip.

Close approximation is good enough. It's not moon-rocket science. If you don't have scales suitable for measuring tiny amounts, 1.5 grams of black cobalt oxide is about ¼ of a level teaspoon. Mix the measured amount of oxide thoroughly into the slip, and work it all through a fine sieve to ensure a uniform colour. Expect the mixture to become a mid-grey colour.

If you choose to use cobalt carbonate instead of the oxide, you'll need half as much again. The carbonate gives the same blue colour in the end of course, but the slip will be pale pink instead of grey, and a bit harder to see when you're applying it.

About the Author:

Roger Graham and his wife Pauline operate a cottage-industry pottery near Gerringong, a small village about 100 km south of Sydney, Australia. Most of their output is domestic stoneware, but many firings include a few small animals, or an owl or a dragon. See some of their pots on the website www.potteryatoldtoolijooaschool.com
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