



working with PORCELAIN

with an introduction and insights from Antoinette Badenhorst

Edited by Ash Neukamm



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550 Polaris Parkway, Suite 510
Westerville, OH 43082

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ISBN: 978-1-57498-392-0 (Paperback)

ISBN: 978-1-57498-626-6 (PDF)

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Publisher: Bill Janeri

Design and Production: Melissa Bury

Introduction and Insights Author: Antoinette Badenhorst

Editor: Ash Neukamm

Associate Editor: Jennifer Poellot Harnetty

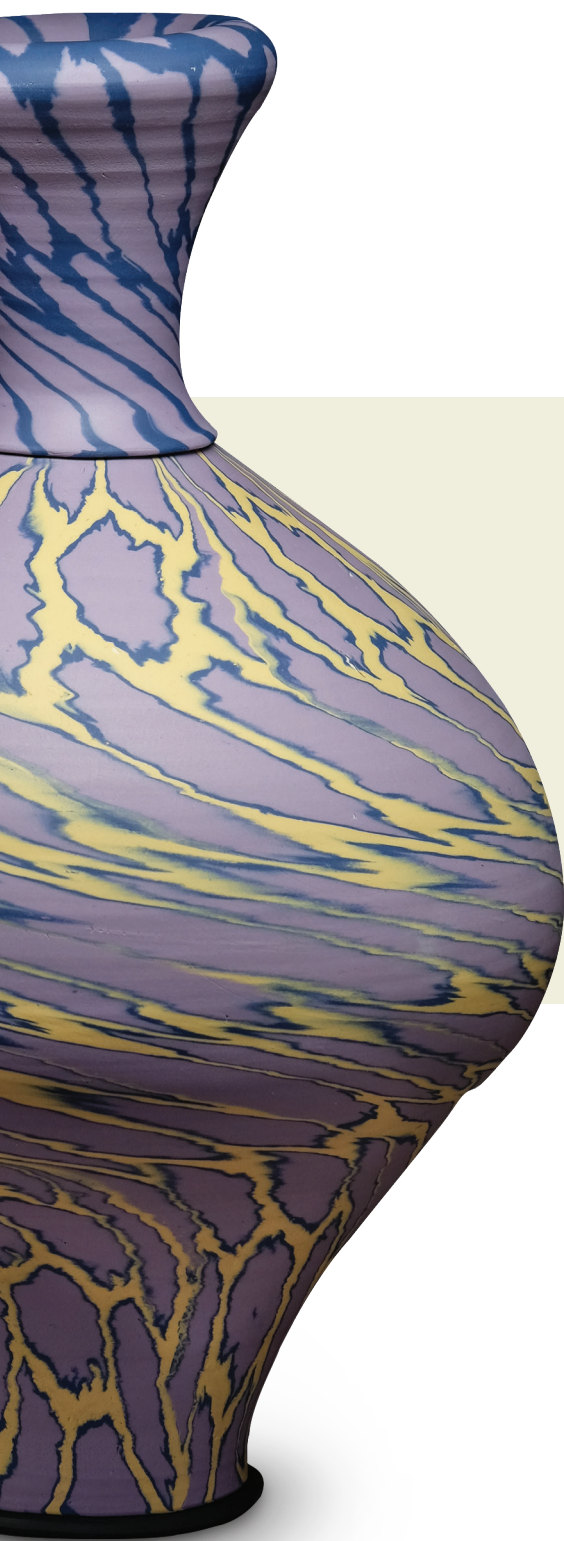
Cover images: Selection from the *Transcend* series, wheel-thrown and handbuilt porcelain, glaze, fired to cone 6 in an electric kiln, 22-karat gold luster, mother of pearl luster, 2014 by Alyssa Black. Image details (top to bottom): Chris Lively, Adrienne Eliades, Sharon Romm

Printed in USA

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Porcelain's Translucent Qualities

by David Scott Smith



Translucent slipcast porcelain elements joined to form a larger object. The center portion was thrown on the wheel then molded, the light 'marks' were made by carving into the clay with a triangle ribbon tool, and the other forms include bananas, flowers, and a snake.

For the last several years, I've worked almost exclusively with translucent porcelain, primarily handbuilding with rolled slabs and assembling slipcast forms. Obtaining translucency with porcelain is one of those subjects that inspire a certain degree of mysticism, and when I first hunted around for information about the process, I encountered a lot of voodoo. The people who were successful were not quick to divulge their secrets. However, I've found that the real trick to working with translucent porcelain involves two key factors: a good translucent clay body and changing the way you work.

The Clay Body

Because porcelain clay bodies do not contain the impurities found in earthenware and stoneware clays, they can become translucent when fluxed correctly and pieces formed from it are thin. If you don't want to make your own porcelain, many commercial clays work nicely. I've used the cone 6 porcelain from Southern Pottery Equipment and Supplies (www.alligatorclay.com) and the cone 6 Grolleg porcelain from Clay Art Center (www.clayartcenter.net) with good results, but check with your local clay supplier. If you want to use porcelain casting slip, I've included a recipe and how-to on page 38. Before you make your first piece, test the clay by rolling, throwing, or casting tiles that are about 1/8-inch thick and carve shallow lines into them. Once fired and held up to the light, you should be able to get an idea of the degree of translucency you can expect.

Changing the Way You Work

Slipcasting: I encourage potters to throw a beautiful piece then make a plaster mold of the form so they can easily slipcast the object to the desired thickness. If you want, you can use commercial molds because they're easy to use and are readily available from most suppliers. When casting, the longer you leave the slip in the mold, the thicker the piece gets, so you'll have to experiment. For small molds, I often pour in the slip, count to ten, then dump out the excess. Since the form is thin, I use compressed air to separate the mold, then use it again around the edge of the clay form to release it (1). Once you've removed the form from the mold, experiment with carving on it. Even



1 Use compressed air to separate the mold and to release the thin clay form without distorting it.

the slightest scratch in the surface changes the quality of light as it passes through the porcelain. Tiny ribbon tools work well for this. You can also apply liquid slip with a brush onto the surface of the cast form, creating thicker areas that can be partially carved later.

Throwing: Throwing pieces thin enough to achieve translucency with porcelain is difficult because the walls need to be no more than $\frac{1}{8}$ -inch-thick. Since this is hard to do, you can throw thicker pieces and carve or facet them when leather hard, or abrade the surface by sandblasting or by using water and shellac resist when dry. When illuminated, the fired work shows a marked contrast between the thick and thin areas (2).

Slabs: Slab building was the first technique I used with translucent porcelain, and I still enjoy working this way. For best results, use a slab roller that adjusts to a $\frac{1}{8}$ inch thickness. Slab rollers that operate with shims may require custom shims. If rolling out a slab by hand, try using two strips of $\frac{1}{8}$ -inch thick wood as height guides, or a series of progressively thinner guides, with the thinnest at $\frac{1}{8}$ inch.

I use bisque-fired clay press molds. Pressing the thin slabs into the mold, creates a variety of textures that translate into interesting effects when the light passes through. The bisque absorbs moisture from the slab, making it firm and easier to build with (3). Work quickly; thin slabs dry out quickly.

Burnouts and armatures: Absorbent materials can be dipped into the slip and draped over an armature (balloons, soft cardboard, paper maché forms, etc.). Felt, lace, doilies, paper towels, or any absorbent fabrics can create wonderful surfaces—it's amazing how close to the original materials the porcelain appears after the organic material burns away. In (4), the form was constructed with strips of fabric dipped in slip then draped over a poster board cylinder. It was built on a broken piece of kiln shelf, with a piece of newspaper between the shelf and porcelain form allowing it to shrink and move as it dried. **Note:** The armature needs to be removable or else it needs to be able to contract with the clay as it dries, otherwise your work will break as it shrinks.



2 Finished porcelain pots with carved, faceted and water-abrasion decoration, fired to cone 6. **3** These pieces started as thin slabs that were pressed into bisque molds of different textures (wildflowers, a stove burner, and an antique brooch) before being wrapped into cylinder shapes and assembled. **4** Fired fabric-dipped cylinder, 10 in. (25 cm) in height, fired to cone 6 oxidation.

Technical Tips for Working with Translucent Porcelain

1. I'm of the belief that clay has a long memory. Whatever you do to the clay before it's fired is remembered, and during the firing the clay gravitates back to an original state. For example, people who make tiles using a slab roller often experience warping during the firing, simply because they bent the slab while they were transporting it from the slab roller to their work area. Even though their tiles dried flat, they curled in the firing.
2. In the case of translucent porcelain, memory is a much larger issue. The clay already has a tendency to want to slump, so it's important to not overly stress the clay while you are making the form. If you bend something and then change your mind and bend it back, it might collapse in the firing. Handling with care is a necessity. For this reason I use an air compressor (and around 30 lbs. of pressure) to remove objects from molds. When I cut or carve, I use the sharpest tools—X-Acto blades or sharp ribbon tools—to create less stress on the surface.
3. Build like an architect. Create a structure that wants to support itself. There are reasons why architects build with arches, domes, and columns; there are similar reasons why potters utilize traditional forms and construction techniques. If a piece slumps, think of it as a clue to a mystery, and use that information to build better the next time around. In the beginning, make less complicated forms (cylinders for example, or even flat slabs or tiles).
4. Minimize movement. Build directly on a kiln shelf so you don't have to try and move the piece once it's finished. I usually put a piece of paper between the shelf and the porcelain. Build larger pieces on a kiln shelf with a waste or firing slab; the waste slab shrinks at the same rate as your work, and will crack before your piece does. Brush a coat of kiln wash on the waste slab so it's easier to knock off after the firing.
5. Be a neatnick. Keep your work area completely free of other clay. Often little bits of clay that get mixed into your translucent porcelain aren't visible until after the firing. Even other porcelain bodies should be suspect—most commercial porcelain blends are not translucent. If you work in a community studio, buy your own sheets of clean canvas, and use them only for translucent porcelain. Take butcher paper and cover your work area, then use new sheets of canvas.
6. Choose the right light. Use energy efficient fluorescent bulbs in any light fixtures that you design and make with translucent porcelain. Incandescent bulbs, even 60 watt bulbs, get too hot and can cause a fire.
7. Cooler by a cone. If your pieces keep slumping no matter how you build, try firing a cone cooler. You may need to experiment firing lower; the reverse is true if your work is consistently not very translucent (it appears dim even with a high wattage bulb, and has an orange or pink color when lit from within).
8. The fired surface. Unglazed porcelain is hard to keep clean; sometimes I apply a thin coat of low-fire clear glaze or watered-down Gerstley Borate to the surface after the first firing.
9. Changing the color. Remember that most glazes diminish (or eliminate) translucency; I recommend china paints and decals or transparent glazes to add color. Additionally, I've had some success with crystalline glazes on cone 10 porcelain. However, one of the most successful ways to change the color is to place a color theater lighting 'gel' used for stage lighting between the light source and the porcelain.
10. Firing translucent porcelain. Reduction firing changes the quality of translucency and clay color. The effect can be very beautiful.

Notes from Antoinette

As discussed in the chapter "Better Porcelain," porcelain becomes translucent if the fluxes and silica in combination with a fairly titanium-free kaolin is mixed together. This will result in short clay that may need plasticizers to improve workability.

Adding plasticizers can become a balancing act, because materials like bentonite or ball clay may contaminate the clay with iron or opacifiers.

Some artists choose pure translucency over plasticity and use clay techniques to support their projects as shown by David Scott Smith who handbuilds with thin slabs and slip-

cast forms, allowing for very thin translucent walls. Nuances of thicker and thinner walls help to create the drama of light and shadow.

When sgraffito, slip trailing, water resist, carving, and sandblasting are done, it accentuates the textural characteristics of porcelain. In cases where contrasting thick and thin elements are used, or wide, dome-like surfaces exists, the clay may become too heavy during the glass forming stage in the kiln, in which case it is advisable to prevent slumping and distortion with the help of refractory supports in the kiln.

Cutting & Assembling Porcelain

by Jeff Campana

People tell me all the time that I'm crazy for making these pots. The time, effort, and staggering loss rate involved with my work makes it perhaps a risky business idea, but I think it's a worthy artistic endeavor nonetheless. The idea rattled around in my head for years before I actually found the courage to make it a reality. I've found that the things that seem almost impossible to make can provide the most richly rewarding experience to the maker and viewer alike.

Decorating through a process of dissecting and immediately reassembling my pots, I make connections between structure, process, surface, and form. More than simple incising, my decoration consists of lines and the architectonic plates between them. Small wanderings in the alignment subtly point out the complexity of process, while the continuity of throwing lines and trim marks allow us to see these vessels with the comfortable familiarity of the simple thrown pot. I share this process in hopes that it inspires others to try their own seemingly insane ideas and find that, in fact, they are possible, and worth pursuing.

Prep Work

The process starts with a leather hard, thrown and trimmed bottomless form made from cone 6 porcelain. The form is ready to be worked on when the clay is firm to the touch, i.e. pressure from my fingertip doesn't leave a mark, but my fingernail will easily leave one. At this stage, the clay is rigid but not brittle. This is important because I don't want the clay to lose its shape in the process, and as accuracy and clean lines are important, the clay can't be so hard that a knife crumbles the edges as it cuts through the form.

I mark the pot with some dots to guide my cutting (1). I use an MKM Decorating Disc for the radial divisions, and a compass without its pencil to measure height.



More than meets the eye—the lines on Jeff Campana's pots go beyond just scratching the surface.

Alternating high and low marks, eight in total, result in a finished form that looks like it has four sections or is divided into quadrants.

Disassembly Required

I flip the pot upside down on the Decorating Disc to begin cutting. Using a box cutter, I carefully cut an arching pattern, connecting the dots (2). I do this freehand, and it did take some practice to get this right although I don't always hit the dots exactly. Once this is done, the top portion is set aside and work begins on the bottom (3).

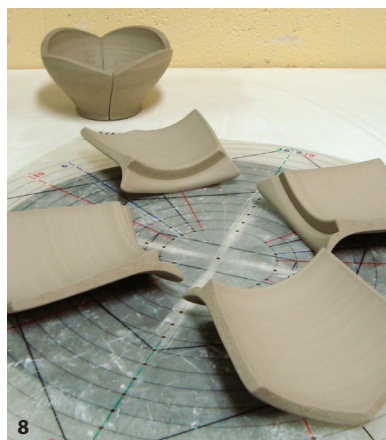
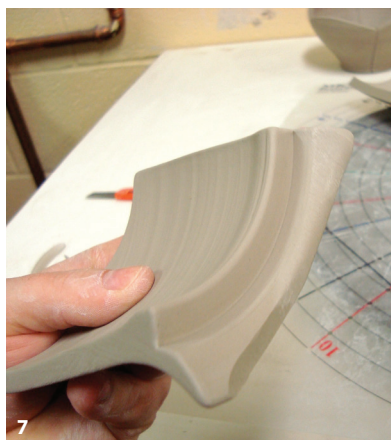
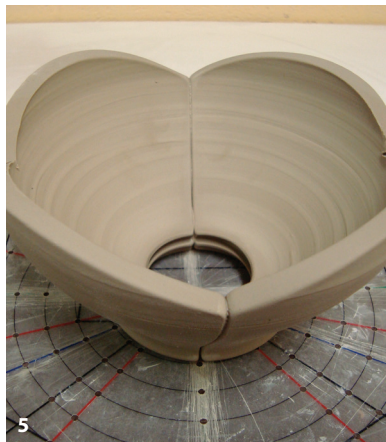
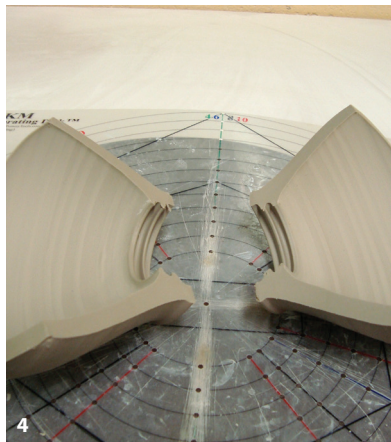
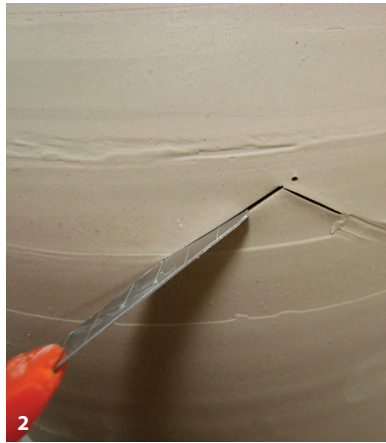
Two vertical cuts on opposite sides divide the bottom part in half (4). I gently sponge the sharp edges to soften them. Using a finely serrated rib, I score the edges, then brush a special joining slip (see page 46 for recipe) into the grooves and sponge off any excess. I quickly press

the two halves back together, making sure there is a continuous connection along both seams (5). The bottom portion is set aside to allow the slip to set up and I switch back to focusing on the upper half.

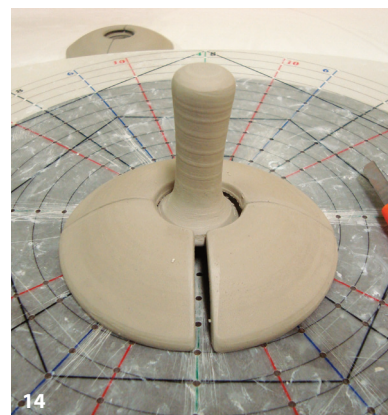
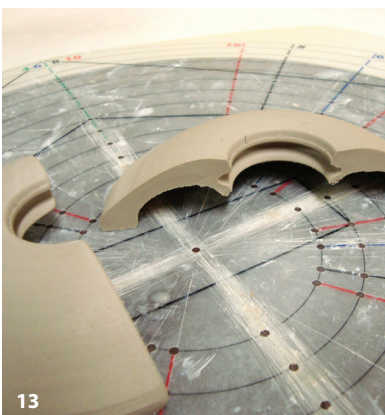
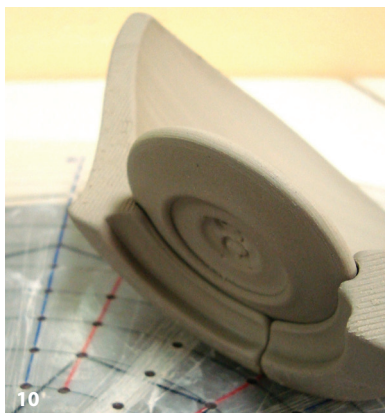
Using the Decorating Disc once again, and working with the piece upside down, I make four vertical cuts, one at the top of each arch (6). For a more dynamic lip line, I carve some of the clay from the middle of the rim on

each part and carefully sponge it until no line is visible in the clay (7). Each piece is put back in its place so that parts don't get jumbled. Once all four parts of the top section are prepped for assembly, I set them aside and move on to finishing the bottom (8).

Two cuts are made on the bottom section, just like before but on the other corners (at a 90° angle from the first cuts), then the edges and topsides are sponged and scored.



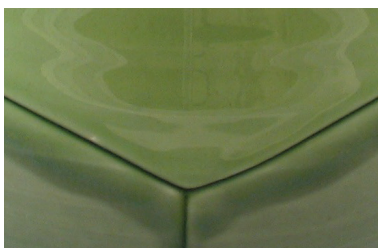
1 Make reference marks using a Decorating Disc and a compass. **2** Connect the dots with curved cuts made using a box cutter. **3** Separate the bottom of the pot from the top after making the cuts. **4** Cut the bottom in half at the lowest point of the arches. **5** Coat the walls with joining slip and reassemble the parts. **6** Place the top on the disc upside down, make four vertical cuts. **7** Carve down the lip in the middle to create a curve. **8** All four parts of the top, with rims facing the middle, are ready to be joined.



9 A stockpile of various bottom discs with differing diameters. **10** Insert the disc into the trimmed groove to check the fit. **11** An exterior view after assembling the bottom two halves. **12** Here, top sections are placed one at a time. The rim's curve is visible. **13** I bisect a prepared lid form. The center opening has a trimmed groove for a knob/disc combination. **14** I rejoin the two sections, bisect it in the other direction and insert the disc end of the knob into the groove.

CAMPANA MID-RANGE PORCELAIN Cone 6-7

EPK Kaolin	20 %
Tile #6 Kaolin	15
OM4 Ball Clay	10
Feldspar	35
Silica (325 Mesh)	20
	100 %
Add: Bentonite	3 %



JOINING SLIP FOR ANY CLAY BODY

I make joining slip by deflocculating my clay throwing scraps. Deflocculation is basically changing the ionic pull of the water. This causes the particles to repel each other, allowing a liquid consistency with much less water than it would otherwise take.

Deflocculating the slip has a number of advantages:

- It reduces the shrinkage of the slip, which reduces the chance of cracks in the drying.
- It gives the slip a nice flowing quality that helps it fill the tiny score marks completely.
- It makes the slip very tacky, so parts joined together have an immediate bond.

I take the big chunks from my splash pan right after throwing. Basically, it should be a little bit wetter than plastic clay. Add a few drops of Darvan #7 to a pint of it. Blend the mixture with a hand-held mixer until smooth. You should notice that it immediately loosens the mixture to a runny liquid. It should be the consistency of honey. If it is too thin or runny, add some more clay. If it is too thick, add a few drops of water. A batch of this should last months.

For each pot, there is a separately thrown and trimmed clay disc that floats freely in a groove trimmed into the inside wall of the foot ring (the groove is visible in 4 and 5). I do this because it results in a very unique, interesting termination for the lines carved into the pot. In the final assembly of the bottom portion, I carefully select the best fitting disc from a stockpile of various sizes I have on hand, kept in the perfect leather hard state in a damp box (9). If one does not fit, I narrow the diameter of a disc by spinning it in my hand and going over the edge with a damp sponge.

I insert the disc into the groove and check that it fits snugly and that the two halves can go back together nicely with the disc in place (10). Joining slip is applied to the two seams and the excess is sponged off, being careful to keep slip out of the groove. After everything is carefully lined up, I squeeze the seam together, again checking that the seam is well joined (11).

Now it's time to begin attaching the top segments one by one. I score and slip each side and carefully attach (12). The placement is crucial. If the part is placed too far out in relation to the bottom wall, the pieces will not meet up when I get to the last connection. The angle needs to be perfect as well so

that the seams connect from the top to the bottom. Before slipping the piece together, I dry fit the parts, getting a feel for their exact position.

The lid is thrown at the same time as the body of the pot, allowed to reach leather hard, and assembled the same way as the body, but in this case, the disc that fits into the center opening on the lid has a knob thrown onto it. I cut the lid in half one way (13), clean it up, score it, and reassemble it. While the slip sets up, I move to the other lid. I learned early on that it's always a good idea to make at least two lids for every pot, just in case something happens to one of the lids in the drying and firing. If both turn out, I can pick the one with the best fit, or the one that looks the best.

Returning to the first lid, I cut it in half at a 90° angle to the first cut, clean it up, and test fit the knobs (14). I keep a stockpile of knobs on hand just like I do with the discs. I slip the two parts and attach them firmly. After finishing the second lid, the drying process begins.

When working with porcelain that's been assembled from various parts, careful drying is essential to the survival of the piece. I keep the jar and its lids loosely covered, drying to bone dry over the course of at least five days.

Notes from Antoinette

Looking from the outside in, the process of disassembling a wheel-thrown object may appear to be an odd and unnecessary exercise to obtain marks on a pot. That may also be the case when an object that is easy to be thrown on the wheel, is painstakingly made by hand, but the artists working with these types of techniques explore "structure, process, surface, and form" as in the words of Jeff Campana.

In addition, he is also connecting with porcelain clay on a different level, exposing the scientific character of the medium.

The myth that porcelain has an irreversible memory and that any action that is taken with porcelain before the bisque firing, will reveal itself in the final product, is proven incorrect with the Campana process.

In fact, porcelain can become completely plastic and pliable from the leather hard phase within minutes after it is hydrated, making it fairly easy to alter.

As mentioned several times now, the key to success lies in the even making, drying, and firing of porcelain during any process, unconditional of whether it is handbuilt or wheel thrown.

When the clay is firm to the touch and it is assumed that the clay will not deform, it is important to note that the human hand always leaves room for error. Due to the size of the clay particles, porcelain starts to dry the

moment it is exposed to elements, which can be anything from dry air, heat and cold, sun or electrical lights, uneven plastic covering, or warm human hands. Unless it is consistently irrigated, like with a water spray bottle, the moisture content will be affected. This drying always starts from the thinnest outer edges.

The individual parts of clay tend to move out of proportion as the piece dries or is rehydrated. That implies that the individual cut parts will lose their form, preventing the artist from reassembling and firing it successfully. However, Campana succeeds to reassemble his pieces with great precision.

Tips to Prevent Distortion:

- Create even walls.
- Secure unfinished work from any drafts, hot or cold spots, as well as light. Darker or thicker plastic is preferable over thin layers of plastic.
- Cutting and altering is best done at the leather hard stage, when a sharp knife will move easily and without force through the clay.
- A light touch is needed to prevent warm hands from drying the clay more than needed. Keep a damp sponge handy to help in the process.
- When an altered porcelain object is finished, slow, even drying and firing is needed.

In *Working with Porcelain*, you'll discover the ins and outs of using porcelain. Compiled from the *Ceramics Monthly* and *Pottery Making Illustrated* archives, along with helpful insights and notes from renowned porcelain artist Antoinette Badenhorst, you'll learn about porcelain's distinctive qualities and how to successfully create with this always beautiful, but often temperamental clay body.

Working with Porcelain provides invaluable information for truly understanding the characteristics of porcelain and how to use the clay body to its highest potential. You'll learn ways to test different porcelain clay bodies and find the perfect porcelain for your work. You'll also find 21 step-by-step projects with building techniques suited to the tricky material and decorating techniques that enhance the smooth surface. Whether you're a beginner or a seasoned pro, *Working with Porcelain* provides the expert information, instruction, and inspiration you need to achieve success with porcelain.

Antoinette Badenhorst was born and raised in Southern Africa. She moved to the United States with her husband and three children in 1999. A potter for more than 30 years, Badenhorst has shown her work nationally and internationally, and has work in several private and museum collections. She has written extensively about porcelain for both Ceramics Monthly and Pottery Making Illustrated, as well as international publications.

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