IN DEPTH

Joys of Firing Porcelain

Part III

by Teresa DeSantis

IN THE PAST TWO "IN DEPTH" ARTICLES, we have looked at how to create perfect porcelain, how to adjust your kiln if it is underfiring or overfiring, and how to prevent "black specks" and mildew. In this final article, we will discuss miscellaneous slip problems which are sometimes met by the dollmaker.

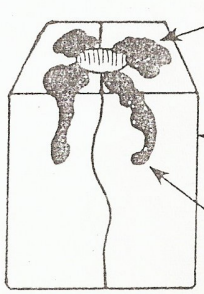
Frozen Slip

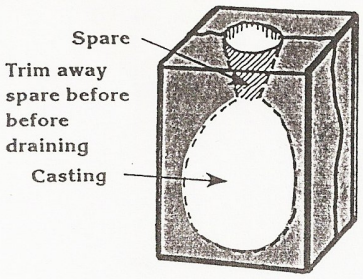
In the winter months, slip is occasionally frozen by accident in shipping or becomes frozen in a cold studio. When you open a jug of slip that has been frozen, it will appear lumpy and uneven, like lumpy tapioca pudding. The best approach to rescuing frozen slip is to let it thaw out at room temperature. Once the slip has thawed, stir it enough to loosen, and then empty it into a larger, wide-mouth container. Scrape the sides of the jug with a spatula to make sure you get all of the slip out. Stir the slip with a mixer, stick, or with your hand. (I find that stirring with one hand works the best!) With you hand, stir the slip in circles, as if you are stirring cake batter. The congealed hunks of slip will begin to separate, leaving you with some fairly smooth slip. Feel carefully for any lumps still remaining. Squeeze these lumps in your hands, and then stir until the slip feels even and not stringy. Rinse out the jug, and pour your restored slip back into it. If the idea of stirring slip with your hands sounds unpleasant, you can get good results with a stick or a mixer. If using a stick, you might want to screen the lumps out with a strainer and pulverize them back into the slip. When using a mixer, remember to let the slip rest after mixing so that all the air can come to the top. Slip that was once frozen does not affect the fired result of the porcelain in any way.

Mixing Slip and Preventing Lumps

Slip stratifies slightly during extended storage. This is why it is necessary to mix your slip thoroughly before using it. When you first open a jug of slip, you may see a thin layer of water on the top. It is important that you do not remove any of this water. This water contains ingredients which are important to the functioning of the slip. When mixing, use a long stick or an electric slip mixer. Mix until the slip is an even, smooth consistency. Make sure that you mix all the slip up from the bottom of the jug. Mix carefully to avoid creating air bubbles. Let any air trapped in the slip during mixing rise to the surface of the jug before pouring your molds.

Lumps may sometimes be created if you empty your molds directly into the slip jug. Clay or plaster may fall off of the mold during draining and enter the clean slip in the jug. To prevent this, many people clean away the spare at the pourhole of the casting and the top of the mold with a soft plastic knife be-





fore draining. Doing this and sponging off the top of the mold to remove any loose clay or plaster particles also helps. Some people also use pantyhose or a coarse mesh screen to remove lumps which may have entered the slip as part of the casting process.

Thin Slip and Thick Slip

Slip thickens rapidly in the first 24 hours following manufacture and continues to thicken more slowly during the following months. Slip thickening is a natural process. Over time, gels form between the clay particles and the organic lignites. Bacteria and mold may also grow in the slip, producing an earthy smell and black patches, which are visible from the clear sides of the jug. Don't panic. This process is entirely natural and beneficial, as it increases the plasticity of the slip. Many dollmakers have found aged slip to be easier to pour and cast than younger slip.

If you find the slip too thick to pour after you have stirred it thoroughly, you may want to thin it with a small amount of sodium silicate or distilled water. What is a small amount? A drop or two of sodium silicate or a tablespoon or two of distilled water added to a gallon of slip is a good starting amount. Add this much to start, and then stir the slip thoroughly, If the slip is still not thin enough, repeat the procedure. Be sure not to add much more than the suggested amounts; adding too much water can create slip which is watery and takes an extended time to cast. Adding too much sodium silicate can alter the casting properties of the slip or make the slip produce porcelain with shiny features. It is better to be more conservative: just add a **little** water or sodium silicate. Then stir the slip thoroughly until it is well mixed. After this, decide whether the slip is thin enough to pour. Using careful judgement should prevent any mishaps.

Slip is usually too thick rather than too thin. If slip is too thin, **do not** drain any water off the top of the slip! If you to this, you will be removing important chemicals needed for the porcelain. If your slip is too thin, you might want to try letting some of the water in the slip evaporate This can be done by taking the lid off the jug and covering the top of the jug with a thin layer of cheesecloth. This approach can be tried as a last resort. The best way to avoid overly thin slip is to not thin it down too much when it is thick.

Swirling in Porcelain Pieces

Occasionally, greenware or bisque pieces may show "swirling." This most often occurs on arms and legs. Swirling appears as a small oval or elongated portion which looks uneven or swirled and lacks the smooth, even look of a normal cast piece. It is different from marbleizing in that the slip is all the same color. Some molds may have a tendency to produce swirled pieces because of air and slip being trapped in the top of the mold.

One way to alleviate swirling is to prop the mold up at an angle with a brick so that the pourhole is elevated above the rest of the mold. This helps trapped air to escape from the mold during the pouring process. Tap the sides and top of the mold slightly during casting to help trapped air escape. Small mold vents present in some molds help to alleviate this problem. If difficulties persist, contact your mold manufacturer and describe your problem to them.

Increased Casting/Release Time

The most frequent cause of increased casting and release time is when the mold you are pouring becomes saturated with water. Molds may become saturated due to pouring the same mold three or more times in a day, and/or casting several days in a row. Casting time may also increase in the summer if you live in a humid climate. If the mold has not had sufficient time to dry in between castings, slip will take longer to cast to the same thickness, longer to release from the mold, and may stick to the mold and rip and tear upon releasing.

The best way to avoid these problems is to give yourself plenty of extra time to cast if you are preparing for a seminar. Don't expect to get more than two or three castings from a mold per day, and make sure the mold has time to dry in between castings. Dry molds out in a warm, dry room which has good air circulation. Leaving a fan on a mold overnight also helps. Make sure all the exterior mold surfaces are exposed to circulating air. Dry molds with all parts of the mold banded together so that warpage does not occur. Do not dry molds in your oven or in a microwave: they may crack.

White Crusting or Shiny Areas on Features

Sometimes bisqued pieces get an opaque white crust or a shine on the tip of the nose and on the high points of other features. This may occur more often on pieces which were cast in older molds or pieces which haven't been soft-fired and wet cleaned. The sodium silicate in the slip migrates to the surface of the wet casting as it dries. Most of the sodium silicate is absorbed by the mold; however, some of it is sometimes deposited on the features of the face.

This problem can be alleviated by the soft-firing and dust-free (wet) cleaning process. After you have removed the seams during the dust-free cleaning process, very gently polish over the entire surface of the piece. Then, gently rinse the piece under running water. This helps to remove any sodium silicate deposits and to eliminate the chance of a white crust or shiny areas forming during the bisque firing.

Eyes Chipping after Soft-Firing

Some dollmakers find that certain porcelains may tend to chip more frequently during eye cutting than others. This problem

may occur in Dresden Flesh, Pearl White, or Nordic White following a soft-firing. Why would this problem occur in these colors and not in others? These porcelains mature to bisque at a slightly hotter temperature than the other colored porcelains. Therefore, they may also require a slightly hotter soft-fire to gain the same amount of strength as the colored porcelains. Firing a cone hotter than your usual cone during the soft-fire will make the porcelain stronger and reduce the tendency to flake or chip eyes during the cutting.

Hairline Cracks in the Bisque

Hairline cracks sometimes appear after the bisque or china firing due to a too-rapid cool down. The best way to prevent this is not to open your kiln until it has cooled to around 300° F. Don't let drafts enter the kiln during the cooling cycle. This includes the peephole plug: only open the peephole plug when the lid is closed. If you open the peephole plug when the lid is open, it can suck cold air into the kiln, which can crack your pieces. If you can still see a red glow when you look in the peephole, the kiln is still over 1000° F., and it is way too early to open the kiln.

In a china fire, you should wait at least an hour after the last sign of red in the kiln to even open it a little. If you need to cool the kiln off in a hurry, **keep the peephole pug in,** and raise the lid ½" with a shelf post. Use insulated gloves and tongs for this procedure. After about 20 minutes, you can raise the lid to 1". Continue the gradual opening of the kiln lid until it is below 300° F., when you can open the lid fully. Keep those peeps plugged until the kiln has cooled to **room temperature.** Keep the plug in: opening the lid with the plug out can cause a draft of cold air to be sucked into your kiln which can cause hairline cracking and even the shattering of all your pieces. It is a shame to loose any precious dolls on their final firing, so just be patient!

Just in Case . . .

If you ever have a problem using our slip, we want to help you as best we can. Save your jugs of slip: don't throw them away. You will probably be asked the lot number of the slip. The lot number is located in the upper right hand corner of the jug (*see* diagram). Save out one quart of the slip in case we need it for further testing. Also, save the witness cones and any bisqued pieces which show the problem, and state your kiln model and firing procedure. Providing the above information and describing your problem in detail help us to help you as quickly and efficiently as possible.

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