

Preventing “S” Cracks

► The “S” crack, while not the only type of flaw that can occur when forming clay on the potter’s wheel, is certainly one of the most common. *by Jeff Zamek*

In the beginning stages of working on the potter’s wheel, many students encounter frustrations with cracking ware. Every potter is occasionally humbled by the sight of their favorite pot displaying a crack. In fact, the one constant when working with clay is that, at some point, something will crack. Fractures can occur at any time during the forming, drying and firing stages, or, in some instances, even many years later.

Though there are several different types of cracks, most can be easily prevented if the correct information is available. Identifying the type of crack is a significant step in finding the cause and subsequent correction. It is at this stage that potters often encounter difficulties; either they cannot correctly recognize the type of crack or they perform the wrong correction.

The “S” crack, while not the only type of flaw that can occur when forming clay on the potter’s wheel, is certainly one of the most common. Its prevention is an interesting technical issue, in that many correction theories have been advanced but few are successful every time for every potter. Understanding the configuration and alignment of clay platelets when centering the clay on the wheel is helpful, and the subsequent pulling up of a cone of clay is essential in solving “S” cracks.

Distinctive Shape

As the name implies, this type of crack is shaped like the letter “S,” and it develops during the forming operation on the wheel. As the pot dries and is bisque- and glaze-fired, it shrinks due to increasing vitrification, causing the crack to fully develop and become observable.

When a fired glaze covers the underlying clay, the “S” crack is clearly visible with a rounded edge. Round-edge cracks occur in the forming or drying process, as opposed to sharp-edged or hairline cracks that occur when the glaze has cooled. Whether round or sharp-edged, the crack is identified by its distinctive shape and location on the bottom of the pot.

Formation of “S” Cracks

“S” cracks can occur on the inside or outside bottoms of wheel-thrown forms. Wider-based forms such as plates have an increased chance of producing this distinctive type of crack. “S” cracks can also take place in forms thrown off the hump (where a large piece of clay is used as a starting point to form small objects such as tea bowls, which are cut off and the next pot is then formed from some of the remaining clay).

“S” cracks occur when incorrect techniques are used before pulling up the thrown form. In clay bodies, clay platelets are held together (in part) by thin films



Close-up view of an “S” crack on the inside foot of a thrown pot. Occasionally, the crack can run straight across the bottom of the pot and have a slight curve on either or both ends.

of water. This unique bonding structure is one of the elements that give moist clay its plastic quality. “S” cracks can develop when there are not enough clay platelets in the base of the pot aligned parallel with the circular direction of the wheel (see Figure 1). The crack starts to form when the base and walls of the pot have different rates of shrinkage in the drying stage.

The correction for “S” cracks is to align the clay platelets in the base of the pot with the direction of the spinning wheel; when this occurs, the base and walls of the pot will have equalized shrinkage rates. Having the correct information on the prevention of “S” cracks is only part of the goal; applying the information accurately is critical to solving this throwing technique deficiency.

5-Step Prevention

While potters can use several marginally effective methods for eliminating “S” cracks, choosing the correct technique is a more reliable option. Simply stated, “S” cracks can be avoided by pulling the clay up into a cone shape and then pushing it down before the actual centering takes place in the throwing operation. (The following directions apply to right-handed potters.)

Step 1. Centering the clay

Use equal pressure with the right palm pushing down and the edge of the small finger and palm of the left hand resting lightly on the bat. Make sure the left hand is positioned at a right angle to the bat before pushing in toward the center (see Figure 2).

A centered piece of clay will result when this technique is performed with the correct amount of water and equal pressure with both hands. Throughout the operation, the elbows of both arms can be kept in touch with the body to increase leverage and gain stability.

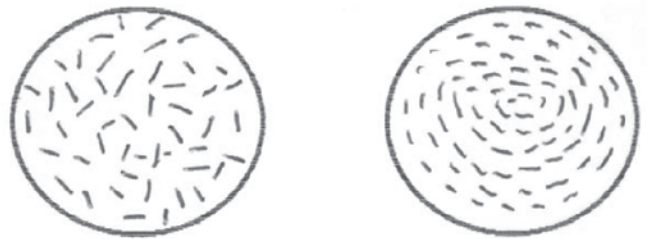


Diagram A

Diagram B

Figure 1. Two top views of a wide-base pot. Diagram A represents a random alignment of clay platelets in the base of a pot. Diagram B aligns the clay platelets in the circular direction of the potter's wheel, enabling an equal rate of drying with the vertical walls of the pot.

Step 2. Pulling up the cone

Wet the centered clay and grasp it with both hands. With the wheel turning rapidly, apply equal pressure inward with both hands to bring the clay up into a cone. As your hands move up the form, apply equal pressure with the index fingers and thumbs

“S” Crack Correction Myths

Why do various corrections for the “S” crack problem work for some potters but are ineffective or inconsistent for others? Listed are several methods put forward to correct the formation of “S” cracking, some of which actually work sometimes. When they succeed, it is because they have aligned the clay platelets in the base of the pot with the clay platelets in the walls of the pot.

Forcefully Throwing the Clay on the Bat

Whether the moist clay is thrown, dropped or placed on the bat is unrelated to the formation of “S” cracks. The process is often time- and labor-intensive, with no appreciable positive result.

Changing the Clay Body

Since the actual cause of “S” cracks can be misunderstood, some potters report an improvement when they change clay body formulas. While different clay bodies might temporarily or sometimes permanently resolve the problem, changing the body does not address the actual cause. Changing clay bodies only indicates that some bodies are more forgiving of the non-alignment of clay par-

ticles in the base and walls of the pot during the forming operation.

Cutting the Pot Off from the Bat After Throwing

After the pot is thrown on the wheel, a cut-off wire is passed between the bottom of the pot and the bat. The assumption is that this relieves pressure on the base of the pot as it dries. However, misalignment of clay particles is the cause of “S” cracking, whether the pot is cut off the bat or remains fixed to it during the leather-hard stage.

Using a Different Type of Bat

Bats for wheel heads fall into two basic categories: absorbent bats made from plaster, wood, particleboard and other absorbent materials; or non-absorbent bats made from materials such as plastic. The absorbency characteristics of the bat do not promote or hinder the formation of “S” cracks.

Compressing the Leather-Hard Inside or Outside Bottom of the Pot with a Rib

Some potters attempt to cure “S” cracks by compressing the inside bottom of the pot with a rib during the throwing operation or

before the pot is removed from the wheel. A similar compression technique involves running the rib on the outside bottom of the leather-hard pot once it has been taken off the wheel. While pressing a rib over the bottom of a pot does align the clay platelets on the surface in a circular direction, which is beneficial, it does not do the same for platelets below the surface layer of the clay.

Smoothing Out the Bottom of the Clay Before Throwing It on the Bat

During the wedging operation, creases or lines can form in the bottom part of the clay that contacts the bat, but “S” cracks can form whether the bottom of the clay is smooth or creased.

Using Harder or Softer Clay for Throwing

The moisture content of the clay is irrelevant to the formation of “S” cracks.

Slow-Drying Pots to Prevent Cracking

Slow-drying the completed pot will not prevent the development of “S” cracks; it will only delay their discovery. As a general rule, once some types of cracks are formed, they stay the same or get worse as the clay dries and is eventually fired.

PREVENTING “S” CRACKS



Figure 2. Centering the clay.



Figure 6. Returning the form to the centered position.



Figure 3. Pulling up the cone.



Figure 7. The correct form should be cylindrical.



Figure 4. Forming the cone's shape.



Figure 8. A pyramid indicates incorrect form.



Figure 5. Pushing the cone down.



Figure 9. Incorrect concave shape.

of both hands, which will compress the top third of the form; this will cause a convex “nipple” of clay to form at the top (see Figure 4).

Step 3. Shaping the cone

Repeat Step 2 at least twice, always starting from the base of the cone. At this stage, the form should look more like a cylinder than a pyramid. When complete, it should have a slightly wider base.

Step 4. Pushing the cone down

With the left hand pushing down toward the center and the upper palm of the right hand exerting slightly more pressure in a downward direction, the cone shape should be compressed downward into itself (see Figure 5).

The form can sometimes take on a “mushroom” shape as it is pressed downward. To avoid this problem, increase pressure of the left hand pushing toward the center as the wheel spins.

Step 5. Returning to the centered position

As the cone is compressed downward and centered on the wheel, the height and width of the centered form can be determined (see Figure 6). Horizontal forms such as plates will start with a wider base than narrow forms like cups.

Incorrect Technique

Improper technique during the cone-up procedure can allow the formation of “S” cracks. Potters are often discouraged when they attempt the cone-up procedure only to eventually see an “S” crack appear in their ware in the leather-hard, bone dry, bisque or glaze firing stages.

At this point, a careful and detailed review of the cone-up procedure is recommended for the eventual elimination of the crack. When bringing the clay up into a cone shape, be sure to keep the base narrow. A wide base will defeat the purpose of the cone-up procedure. The correct form is more like a cylinder than a pyramid (see Figures 7 and 8).

If the top of the cone develops a concave area, the clay platelets are not aligned correctly (see Figure 9). In many

instances, an “S” crack is in place when the cone is pushed down and the clay is finally centered on the wheel head. To prevent this defect, the index fingers and thumbs should be applied with increased pressure when arriving at the upper part of the cone, as shown in Figure 10. The top part of the cone should never have a recessed area at any stage when bringing the clay up into a cone or pushing it down for the centering operation.

“S” cracks can be prevented by correctly bringing the clay up into a cone before centering.

If the clay platelets are not aligned properly, the probability of an “S” crack forming is greater, depending on factors such as an individual potter’s centering technique and, to some extent, the specific clay body formula. Some clay bodies are more forgiving of incorrect throwing and centering techniques. Put another way, correctly pulling the clay up into a cone shape and then centering the clay can eliminate the “S” crack when using any clay body. On the other hand, not pulling the clay up into a cone or incorrectly forming the cone forces the potter to depend on a more-forgiving clay body or other correction techniques that might not be successful.

Clay Alignment

Another way to illustrate the importance of circular alignment in the clay platelets is shown in Figure 11, where white and brown clay were used together. In Figure 11a, the

clay mixture was brought up into a cone correctly and then pushed down into a flat surface. A wire tool cut away the top layers of clay to reveal the circular pattern.

Figure 11b reveals the same white and brown clays, but in this instance they were not brought up into a cone shape. The center pattern indicates that not enough clay was moved into a circular position, which can result in an “S” crack. Conversely, the more complete alignment shown in Figure 11a will prevent “S” cracks.

Clear-Cut Solution

Not fully understanding the cause of “S” cracking often leads to marginally successful methods of trying to solve this common throwing defect. While other methods of preventing “S” cracks do sometimes work (see “S” Crack Correction Myths sidebar), they do not fully address the central cause of the problem.

While “S” cracks can be a chronically frustrating problem, they can be prevented by correctly bringing the clay up into a cone before centering. In fact, the diagnosis and cure for “S” cracks is so clear-cut that it can be described over the phone to a troubled potter. In this regard, it is unlike many pottery techniques that actually have to be observed and sometimes revised to achieve any degree of success. 🌐

About the Author

Jeff Zamek started Ceramics Consulting Services in 1980. He works with individual potters, ceramics companies and industry, offering technical advice on clays, glazes, kilns, raw materials, ceramic toxicology and product development. In addition to Pottery Production Practices and the PPP HotSpot, he is a regular contributor to Ceramics Monthly, Pottery Making Illustrated, Clay Times, Studio Potter, Ceramics Technical and Craft Horizons. Jeff’s books, What Every Potter Should Know, Safety in the Ceramics Studio and The Potter’s Studio Clay & Glaze Handbook, along with The Potters Health & Safety Questionnaire, are available from Jeff Zamek/ Ceramics Consulting Services, 6 Glendale Woods Dr., Southampton, MA 01073.



Figure 10. 🌐 Correct convex shape.

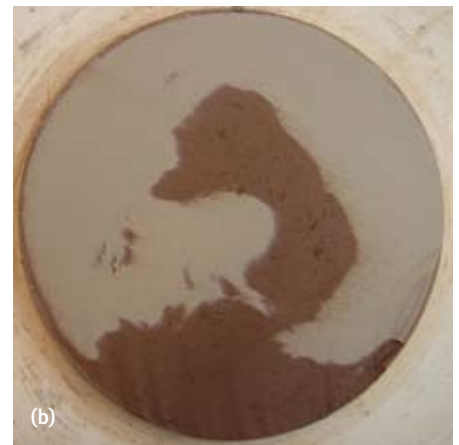
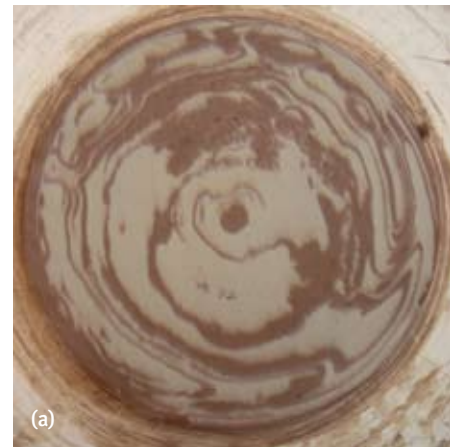


Figure 11. Cross-sections of two plates, one thrown using the correct cone-up procedure (a) and the other without using the cone-up procedure (b). Using the cone-up procedure clearly results in more complete clay circular alignment.