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Ceramic Fiber vs. Firebrick Kiln Interiors

by Viqui Sanchez (and heavily drawn, with permission, from the work of John S. Hohenshelt, president, Paragon Industries, a well known manufacturer of kilns)

The growing popularity of bronze and copper—not to mention silver—clays has sparked a great deal of discussion of the differences between firebrick and ceramic fiber interiors for kilns. In this paper, we will examine the differences between these materials for kilns as well as the firing requirements for the different metal clays with respect to these materials.

Ceramic Fiber Kilns

The interior of a ceramic fiber kiln is essentially spun brick. The same materials that make a firebrick are heated to melting, injected with water, and forced at high pressure through nozzles, forming fibers. The fibers are collected, compressed and laid together to form a soft, pliable blanket. Heating elements are then embedded in the blanket and are not visible in the chamber. Because a lot of air remains trapped among the fibers, the blanket is a terrific high-temperature insulator.

Ceramic fiber kilns were originally designed to fire fine-silver clays. Some fine-silver clay materials require less than 30 minutes to fire with excellent results. Paragon developed its 'SC' line of kilns to take advantage of the quick firing properties of these new clays, designing the kilns with high-temperature ceramic fiber and embedded heating elements. The ceramic fiber has very low thermal storage, which means it requires less energy to heat up and stores very little heat energy during firing. This allows more of the heat generated by the elements to go toward heating the firing chamber and its contents rather than be held unproductively within the walls of the kiln. This also allows the kiln to cool faster after the firing sequence is complete, so that the piece itself cools more quickly. Most firing processes on silver clays can be accomplished in less than half an hour.

Firebrick Kilns

The interior of a firebrick kiln features a wall of interlocked refractory ceramic blocks, lightweight and somewhat porous, that withstand high temperatures but offer low thermal conductivity (providing greater energy efficiency). The heating elements are set into grooves in the brick walls and are exposed and easy to see.

Firebrick kilns cannot accomplish firing processes at the same speed as the fiber kilns and take longer to cool enough to allow the artist to comfortably remove the fired clay. As a result, artists cannot fire as many projects in a given period of time as is possible with ceramic fiber. Over the years, the ceramic fiber kilns have shown their reliability, firing hundreds of loads year after year.

The New Clays

Enter the more recent development: bronze, copper and sterling metal clays. Bronze and copper clays require much longer firing times than do fine-silver clays. Some of the firing sequences run for up to ten hours and include long hold times. For this reason, fiber kilns with embedded elements are not the best kilns for this application. First, because the fiber does not store thermal energy as well as insulated firebrick and requires more electricity, running longer, to keep the temperatures consistent for these long hold times. Second, heating elements have an expected lifespan based on the amount of time electricity flows through them. The long firing times will decrease the number of firings achievable in the kilns so the elements will need to be replaced more often than firing silver clay in the fiber kilns. Because they are embedded into the ceramic fiber, these elements cannot be replaced separately. Instead, the entire firing chamber (fiber and elements) must be replaced as a single unit.

The New Clays (continued)

A firebrick kiln, on the other hand, with the high heat retention of its firebricks, easily holds temperatures, with less electricity used and with the elements running for shorter periods of time. When the elements do need replacing, because the heating elements are set into grooves in the firebricks and exposed, the relatively inexpensive elements themselves are simple to remove and replace.

Wear and Usage Factors

Think of the wear factors this way: A silver clay artist can fire 200 times in a year and have only 100 hours' worth of actual usage time ($\frac{1}{2}$ hr. per firing x 200 firings) on the kiln's elements. A bronze clay artist may fire only 100 times, due to the longer firing time per cycle, but will have about 1000 hours' worth of usage time on the kiln's elements (10 hrs. per firing x 100 firings). The difference between 30 minutes per use and 600 minutes (10 hrs. x 60 mins./hr.) per use is significant. The bronze clay artist ends the year with half the number of firings but ten times the wear on the kiln and its elements.

Put another way, you could think of firing like driving a car. If the trip is only 30 miles, the wear on the car is much less than it is on a 600 mile trip. It is not the number of firings (trips), but the minutes of firing time (miles) per trip that ultimately matter.

So, What Kiln Do You Need?

How do you choose the right type of kiln for your needs? The answer comes down to: What do you work with most?

A fiber kiln, with its fast-heating embedded elements, is the best choice for firing fine-silver clay and it can be used for longer firing programs. The artist should understand that the kiln will produce fewer firings over its life due to firing these materials.

A brick kiln will serve better, and longer, for firing those metal clays that require long firing times, but also can be used to fire fine-silver clay. The kiln may not fire these pieces in as short a time as the fiber kilns, and will take longer to cool enough for the artist to handle the pieces, but its elements will last longer between replacements.