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An Approach to SINGLE FIRING—FURTHER IN

by Steven Hill



*Further in, O my love, take me further in,
So deep in this mystery, my tears on yours depend,
And they like some wild river flow as we go further in,
Further in
—Greg Brown*

"Three Ambiguous Bowls," to 8 in. (20 cm) in height, thrown and altered stoneware, ribbed-slip surface, with multiple sprayed glazes, single fired to Cone 10 reduction. Hill makes his pieces so they appear as a fluid whole—the undulating rim, the ribbed slip and the cut feet of the bowls work in conjunction with each other.

As I ponder the twenty years that have passed since I initially wrote about single firing [see "An Approach to Single Firing," January 1986 CM], I think about how much has changed and how much has stayed the same. Since I am currently recovering from bypass surgery, one very big thing has changed for me! I faced my own mortality and came out swinging. Hopefully I will be here in another twenty years to give one final update on single firing!

In spite of historical precedents, the field of contemporary ceramics has never embraced single firing. In the beginning, I was naïve enough to imagine that studio potters would see the advantages and begin to explore raw glazing. Although I know my article and workshops have inspired many, it has mostly been a solitary road I have traveled. I may not have changed the way the pottery world viewed single firing, but single firing has perpetually guided and focused my efforts. Through my experiences, I learned to trust the process, to listen to the lessons my materials taught me and to always follow my heart.

Everyone knows that single firing eliminates the bisque, saving both fuel and labor. In reality, however, one must extend the firing during burnout (1400–1700°F), which minimizes fuel savings. The labor saved by not having to stack and unstack bisque firings is indisputable, but this alone would never have been enough. For me, the principle advantage of single firing is the connection I feel to the process.

When I first experienced single firing at a salt glazing workshop taught by Peter Sohngen, I was in undergraduate school and had not yet found my voice in clay. There was often a lag time of weeks waiting for bisqueware and glazing felt like an afterthought, as my heart was always with the new pots spinning off my wheel. Glazing greenware quickly connected the separate stages of pottery making for me; the throwing, decorating and assembly flowed naturally into the glazing and firing cycle. The entire process became cohesive. I swore I would never fire another bisque kiln and have not wavered for 33 years!

Single firing has not been without its frustrations, however. My pots have cracked and delaminated in the glazing process. They have blown up and blistered in the firing. I have never felt significant limitations, but raw glazing has always guided me, influencing me to spray glazes, to make robust forms with well-defined rims, and to be more decisive, both when throwing and glazing.

Clay

Until the mid 1990s, I formulated and mixed my own clay bodies, following the guidelines I prescribed in my 1986 article, focusing on tight bodies with a high percentage of ball clay. I had considerable success, but was never able to totally avoid the frustrations incurred during glazing.

Since 1995 I have been using Laguna B-Mix exclusively. It is an extremely plastic, light gray (in reduction), porcelainous body with bentonite. It resists rehydration during glazing more effectively than any clay body I have used. In fact I would say if its working properties, color and temperature range appeal to you, that there is almost no other choice. That said, all clay bodies involve compromise and none have universal appeal. For instance, B-Mix's extreme plasticity requires conscientious joinery to avoid drying cracks.

I have always been a precise thrower, avoiding thin spots that can lead to delamination. I discussed this problem in my 1986 article, but had not yet named it. Delamination can occur as the water penetrates the wall from both sides after glazing and rehydrates the clay, causing it to expand. If the wall is too thin, the clay can rip apart, leaving a void in the center of the wall with a corresponding bump and sometimes a crack on the surface. Although this looks somewhat like bloating, it occurs during glazing, rather than firing. B-Mix nearly eliminated delamination for me, leading to a greater freedom in my throwing and assembly of pots than I had ever felt before!

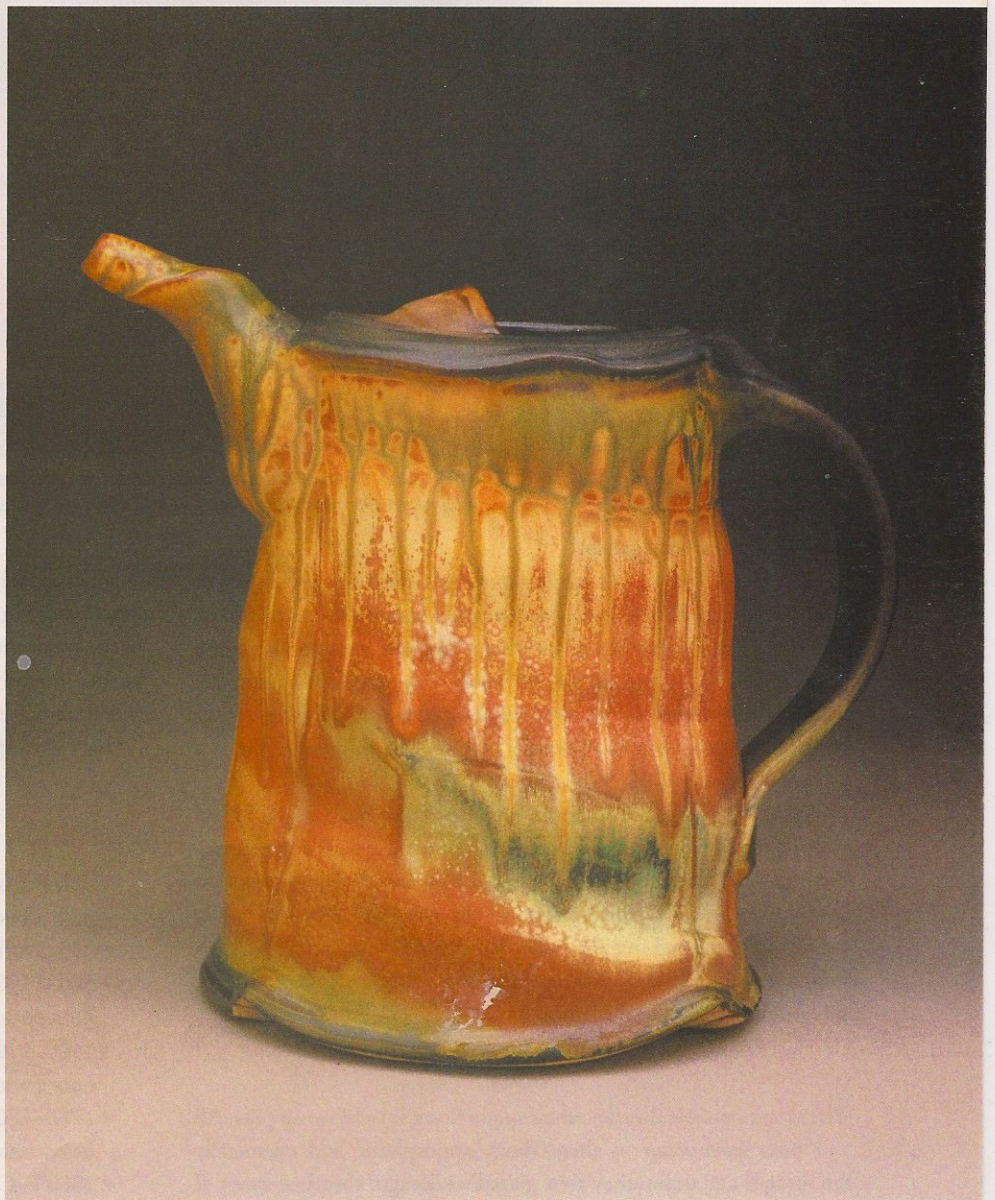
Since most potters use commercial clay, the only advice I can give is try your current body and see how it works. The unique properties of your clay body will have a tremendous impact on your success and on whether you perceive single firing as a joyful experience or as a needless hassle. There are literally hundreds of commercial clay bodies available, and a great many of them can be successfully raw glazed and single fired.

Glaze

When raw glazing, one must make the decision whether to glaze bone dry or leather hard. I don't recommend glazing between these stages, as the pot is likely to be dry at the rim and wet near the foot. This will lead to a discrepancy in water absorption and potential cracking. I have always

glazed my pots bone dry at the end of a work cycle, but if you glaze leather hard you must glaze when the pot is ready. The pores of leather hard pots are still partially filled with water, so there should be lower water absorption and less chance of delamination or cracking. On the other hand, leather hard pots will continue to shrink, requiring a higher percentage of clay in the glaze and thus limiting glaze choice.

When a raw pot is glazed, the clay rehydrates and subsequently swells. Then as the water evaporates it contracts. If the glaze recipe has no clay it will lack plasticity and flake off as the pot dries. If the glaze contains some clay, but not enough, it is likely to crawl during the firing. In 1986, I recommended a lower limit of 5–10% kaolin and 2% bentonite, but I have recently used as little as 3–5% kaolin and 2% bentonite. I even use one glaze, Cornell Iron Saturate, which has just 3% bentonite for its total clay content.



"Watering Can," 9½ in. (24 cm) in height, thrown and altered stoneware, with trailed slip, multiple sprayed glazes, single fired to Cone 10 in reduction.

There are a number of other glaze ingredients that, either through flocculation, deflocculation or excessively small particle size, keep glazes wet excessively long after application. Gerstley borate is a real culprit and, to a lesser extent, most boron frits. Other ingredients to be wary of are soda ash, tin oxide, zinc oxide and possibly titanium dioxide. Any of these can be used successfully, but with an increased chance of delamination. My personal solution has been to spray glazes, as water absorption is minimized. Creative thinking will solve just about any problem in ceramics.

Glaze Application

Just about any glazing technique used for bisqueware can be adapted for single firing. Pouring, dipping and brushing are all viable if you consider water absorption and the potential it has to weaken the wall. However, when pouring and dipping, there is a limit to how many coats can be applied, and both the inside and the outside should be glazed in close succession, so they expand and contract simultaneously. Handling pots can be an issue—certainly glaze tongs are out, but picking up a pot by the rim or squeezing the foot also can lead to cracking.

For the last ten years spraying has been my primary glazing technique (see “Spraying Glazes,” Spring 2002, *Pottery Making Illustrated*). I pour the interior of all enclosed forms, but use the spray gun to glaze the exterior of pots, and for both the inside and outside surfaces of open forms. The undeniable advantage of spraying is that water evaporates as the glaze travels from the tip of the spray gun to the clay surface. Multiple layers can be applied without the risk of excess water absorption, making it unnecessary to glaze the outside of the pot immediately after the interior.

In the '70s I sprayed glazes to emulate atmospheric firing. I soon realized the practical advantages and spraying became a primary method. As I became more skilled I developed techniques that allowed me to both isolate color on my rims and feet and subtly blend glazes throughout the body. Now thirty years later, it is clear how my technical skill and aesthetic sensibility developed side by side, each influencing the other.

Firing

The worst possible disaster when single firing is to blow up pots. All raw pots have water in them (both atmospheric and chemically combined) and unless they were glazed weeks ago, absorbed water. If the temperature rises too quickly as water is turning to steam, an explosion can occur. The tighter the clay body and the thicker the

piece, the more likely this is to be a problem. If a pot blows up in a glaze firing, there will be shards scattered throughout the kiln landing on horizontal surfaces such as rims, lids, plates and bowls. I've lost nearly half a kiln load from one explosion! It's not difficult to safely preheat the kiln, but it does require patience.

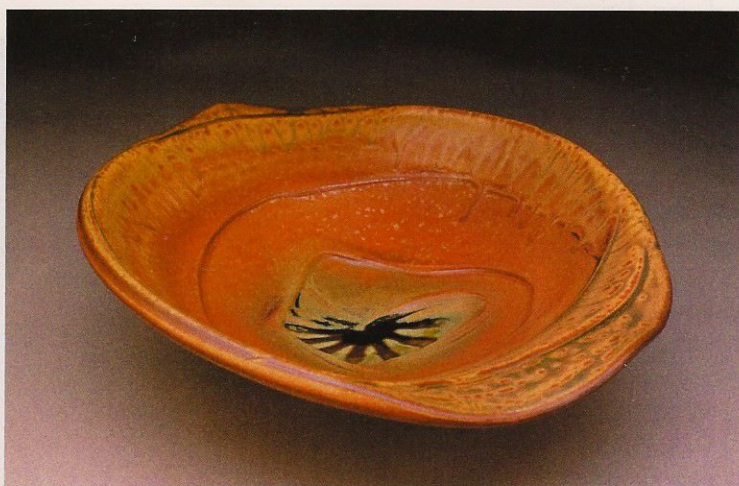
In fuel burning kilns, the top third of the kiln can be several hundred degrees hotter than the bottom during the early stages of preheating. In a downdraft kiln the bottom will quickly catch up as the chimney begins to draw. Therefore, I recommend a slow preheat to 500°F. I take seven hours, but if you are firing large, thick sculpture you might need to go slower.

Once beyond preheating, the temperature can proceed quickly to the burnout phase. Between 1400–1700°F, the kiln should be oxidizing with enough time allowed for the organic material to thoroughly burn out. Typically, pots go through this temperature range three times: once as the bisque kiln is fired; again as it cools; and a third time during the glaze firing. When single firing you have only one chance to burn out the volatiles! If the atmosphere is not oxidizing or if you go through this stage too fast you risk trapping organic material under the melting glaze. After the glaze melts, the organic vapors will begin to escape, causing the glaze to blister, pinhole and, in extreme cases, the clay will bloat.

I fire a Geil gas kiln with a programmable computer. This has been a blessing, as it prevents my impatience from getting in the way of the ideal firing. If I didn't have a computerized kiln I would likely be less careful with preheating and burnout. There is simply no substitute for experimentation with firing schedules to see how they interact with specific clays and glazes.

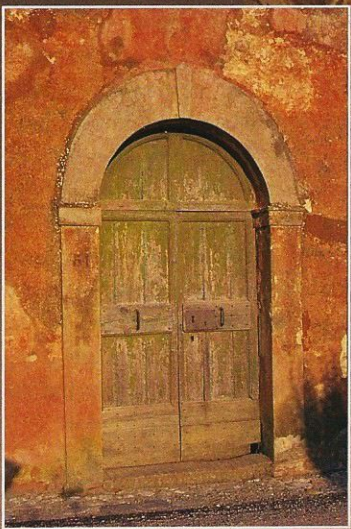
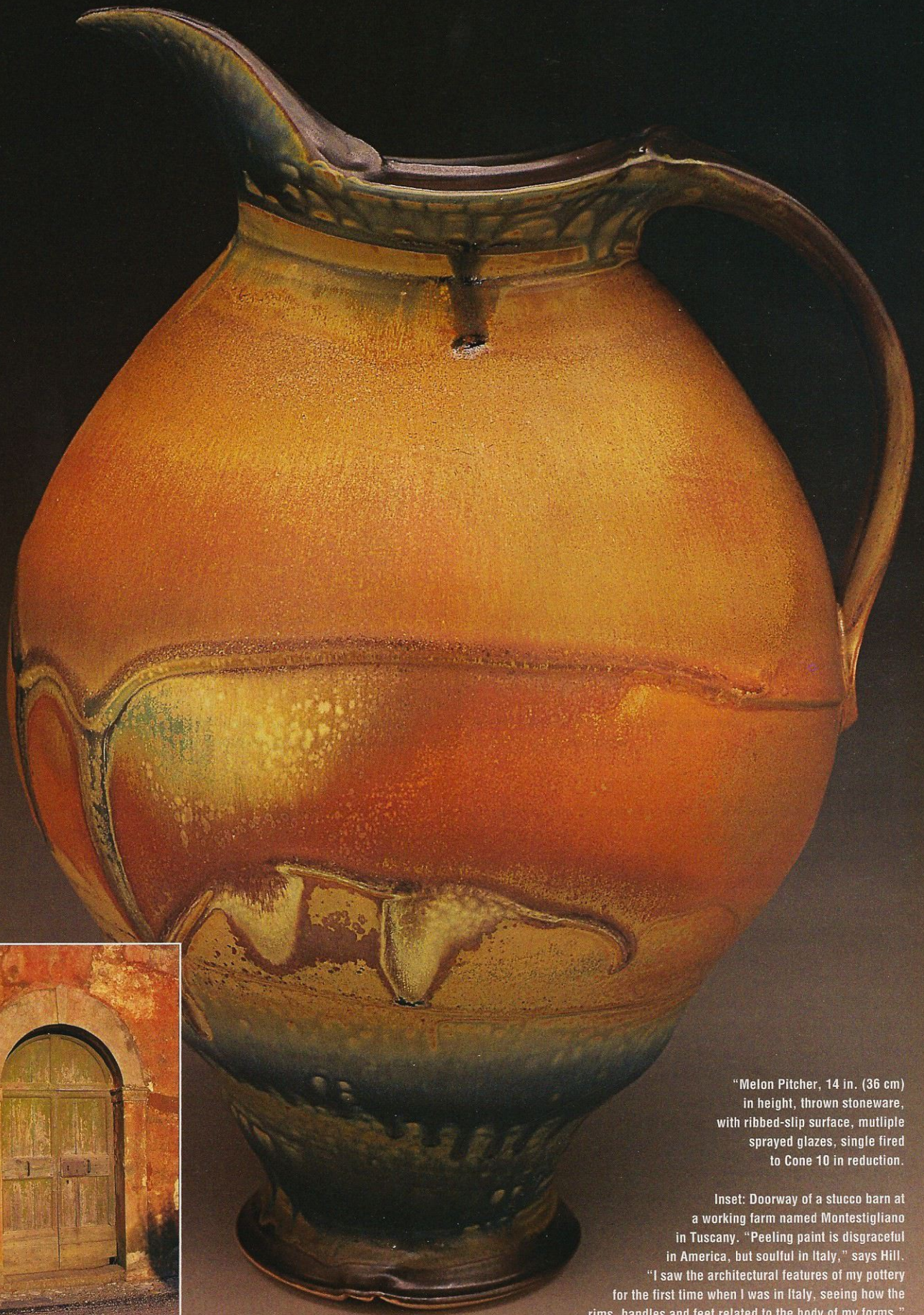
Steven Hill's Single Firing Schedule (Pre-Reduction)

- Room temperature to 225°F (107°C): three-hour ramp, with a two-hour soak at 225°F.
 - 225–500°F (107–260°C): two-hour ramp with no soak.
 - 500–1500°F (260–815°C): three-hour ramp, with a two-hour soak at 1500°F.
 - 1500–1700°F (815–926°C): two-hour ramp, with a two-hour soak at 1700°F.
 - 1700–1800°F (926–982°C): approximately one hour in heavy reduction.
 - 1800°F–Cone 9: approximately six hours in light reduction.
 - Cone 9–Cone 10: approximately one hour in oxidation.
- Once the kiln is in reduction it is fired manually.



Bowl, 10½ in. (27 cm) in length, thrown and altered stoneware, with ribbed slip, multiple sprayed glazes, single fired to Cone 10 in reduction.

PHOTOS: AL SURBANT



"Melon Pitcher, 14 in. (36 cm) in height, thrown stoneware, with ribbed-slip surface, multiple sprayed glazes, single fired to Cone 10 in reduction.

Inset: Doorway of a stucco barn at a working farm named Montestigliano in Tuscany. "Peeling paint is disgraceful in America, but soulful in Italy," says Hill. "I saw the architectural features of my pottery for the first time when I was in Italy, seeing how the rims, handles and feet related to the body of my forms."



Two mugs, each 5 in. (13 cm) in height, thrown and altered stoneware, trailed slip, with multiple sprayed glazes, single fired to Cone 10 in reduction, by Steven Hill, Kansas City, Missouri.

Oxidation and soaking are still important if you are single firing in an electric kiln. If you don't vent the kiln by actually drawing fresh air through the kiln chamber, there can be local reduction caused by the carbonaceous material in the clay. This reduction can prevent thorough burnout and cause blistering. Don't just assume you are in oxidation, even if you are firing electrically!

Further In

It is easy to look back on the last 33 years and see the profound effect that single firing has had on my work and on my career. Although I never saw it as a limitation, the growth of my work has been subtly directed by the constraints of raw glazing. It led to expanded use of the spray gun, which allowed me to both isolate and blend glazes in ways that eventually became a signature. In 1995, after traveling to Tuscany, I wanted my pots to have surfaces with the rich earthy colors and the soulful depth I saw in the multiple layers of peeling paint visible on ancient stucco walls. For the first time, I also saw the architectural attributes contained within my organic forms. Spraying was a natural way to achieve these subtle variations of color and texture, but it also allowed me to isolate glaze on my rims, feet and handles, in order to emphasize architectural features.

Another undeniable effect came when "An Approach to Single Firing" was published twenty years ago and the ceramics world began to notice my pottery. That exposure led to my first few workshops, which eventually developed into the very core of my career. I discovered a passion for teaching and I'm fortunate to have had innumerable opportunities over the last twenty years.

Obviously, single firing is not for everyone and no one should pursue a way of working that feels uncomfortable. Also, if the goal is extreme delicacy and thinness, deep carving, or complex painterly surface design, there are important reasons to bisque fire. The issue is to follow your passion, whatever it might be, with everything you've got!

With my first single firing experience, I was affected on a primal level and inspired to go further in. As I achieved the necessary skill to focus beyond technique, my artistic vision developed and single firing began to soulfully connect me to my work. I simply opened my eyes and heart, and let influences flow through me. Music, nature, architecture and pottery all left their mark. Single firing helped unify varied sources of inspiration, while determination has given structure to my journey for 33 rich and rewarding years.

the author Steven Hill owns and operates Red Star Studios in Kansas City, Missouri. See www.redstarstudios.org.