Exploring the Tradition of the Soda Firing Process

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BY DEREK T. HAMBLY

Abstract

The body of research I have conducted is centered on developing two focuses in the discipline of ceramics. The first is to design and construct a gas-fired cross-draft soda kiln in which to fire ceramic works. The second focus was to experiment with glaze formulas that are complemented by the soda fire process. With both focuses fully researched I will strengthen a fundamental understanding of this creative process as a whole.

This research is beneficial in promoting growth on an individual level as an aspiring ceramic artist as well as providing valuable documentation to all others in the discipline whether they are students or professionals. As it is my intention to teach ceramics at the collegiate level this body of work is truly a giant stepping-stone in becoming a complete and competent ceramic artist.

INTRODUCTION

The body of research that I have conducted this summer was focused on developing and strengthening my background within the discipline of ceramics. One aspect of this research was to design and construct a reduction atmosphere kiln. In terms of the many kiln designs and firing styles that now exist within the field of ceramics I wanted to explore something that I had not been exposed to during my studies at Bridgewater State College. The firing process I decided to investigate was that of the tradition of soda firing. This specialized firing process was chosen in order to broaden my exposure to the many variable aesthetic qualities this style of firing can achieve. The specific design of the kiln as well as the fuel source for the firing process was a major consideration and a great opportunity to delve into new realms of the discipline.

The kiln design itself is primarily known as a barrel-top cross-draft kiln. The
fuel source that was chosen for firing the kiln was propane. Previously I had the opportunity to work on designing and construction of a downdraft wood-fired kiln. This new design and fuel source allowed me to explore many new aspects of kiln engineering. Another aspect of my research was to continue to explore and produce new forms of ceramic works using the wheel as my primary tool for production. This allowed me to produce works to experiment with when firing the kiln. I was able to use these works for the use of experimentation of glaze formulations that are conducive to the soda firing process.

This was also a great opportunity in that it allowed me to collaborate with a fellow potter, Kristina Stafford. The choice of design and kiln construction was an overlapping aspect of our proposals and was a challenging endeavor for both of us. In order for us to reach the other aspects of our individual research we needed to complete the kiln construction in a timely and efficient manner, and this was achieved. Exploring these ideas of research has allowed me to strengthen my understanding of the creative process of ceramics as a whole as well as establishing a sense of community within my work habits. The following is a documentation of the significance, methodology, and results of researching these ideas in the craft of ceramics.

SIGNIFICANCE & METHODOLOGY

On a personal level this research was most beneficial in that it allowed me to again be reacquainted with the experience of working as a researching artist. It is not to say that this is not the scenario while conducting my studies through the course of a semester, but rather that my attention is focused to my one passion in ceramics while researching. This allows for many other beneficial opportunities in that I can work day to day with no other commitments but to that of my craft.

This research is primarily a hands-on process of discovery through the act of creation while examining fundamental, specialized, and traditional processes of creating ceramic art. This research is also a valuable tool in that it provides a documented body of work to further educate those in the discipline, as well as others, and will provide new exposure to those not acquainted with ceramics.

This body of research in regards to my intentions of becoming an educator within the discipline of ceramics at the collegiate level, influences many aspects of my craft. As artists and educators within the arts are one in the same, the value of our work lies within the contribution to the community as a whole. Every work holds a lesson, a problem resolved, a statement, or nothing at all. The undeniable truth is that the act of creation and the product of that act both are educating tools.

Having again the opportunity to do both on an individual level has allowed me to explore a more personal side to my work. Every artist has what is referred to as a "voice." Finding this on the other hand is the challenge, and this research has granted me the freedom to experiment with my work as well as refining my craftsmanship within the skills I already possess. Exploring these ideas in terms of creating works was much more comfortable this time around. Because I had already come to terms with maintaining a clean and safe working environment in the studio as well as properly managing my time, I had much more time to create work. In regards to the designing and construction of the kiln, Kristina and I were able to finish the building of the kiln because of my previous kiln experience. In addition, our mentors allowed us to move towards our goal with great efficiency.
Designing and constructing the kiln was a very calculated process that involved many considerations. The first concern was that of the type of kiln to be built. We all agreed that a smaller kiln than the previous one that I had built would be sufficient. The kiln would be used during the semester by more advanced ceramicist and thus encompassed a smaller community of artists not requiring a larger modeled kiln. This would also allow for more frequent firings due to a smaller stacking space for works. The style we chose was that of a barrel-top cross-draft kiln. We also chose the primary fuel source as a propane-burning kiln that would be specialized by the treatment of a soda compound in order to explore the aesthetic qualities of this traditional firing. This traditional firing style is a primary focus in my research and I will have the opportunity to explore many textural aesthetics in regards to glazing treatment.

Once these choices had been made the construction of the kiln was started. The first thing we had to do was lay a solid concrete slab reinforced with rebar as a foundation for the refractory bricks used for the kiln. This foundation is necessary to protect the kiln yards floor structure from heat damage as well as insulation for the kiln floor.

Once the foundation had cured the kiln floor was laid. The bricks that were used for the kilns construction are specifically fabricated for kiln building in that refractory material used to make the bricks are rated for the temperatures we require for our firings. These temperatures exceed over twenty three hundred degrees and the bricks have a life expectancy of up to twenty years. The bricks were sealed with a self-hardening mortar mix that cures for a tighter insulation during the first firing.

We also had the opportunity to order custom cut bricks for specific areas of design in the kiln such as the barrel-top arch and flue openings as well as the bag wall. The floor of the kiln was laid in two layers. The first was a layer of soft insulation brick and the second was custom cut hard bricks that provided the template for the walls of the kiln.

The next aspect of construction incorporated mapping out the door of the kiln, the burner port flues, and the exit flues to the chimney. In the same manner as the floor these aspects of the construction where done with the interior layer.
was laid with hard bricks and the exterior was laid with soft insulation bricks. These specific aspects of the kiln's design needed a great deal of attention in regards to providing stability for the kiln's arch roof and for proper spacing for the flue ports, spy holes, and spray ports. Careful attention was also paid to the burner port opening size in relation to the exit flue size as to not choke the flow of the flame. Simply put, what goes in must come out.

Once the walls were built the arch roof was laid down. In order to provide stability for the arch while the mortar hardened and sealed, a removable plywood frame was constructed. With the frame still in place we provided further stability for the kiln by building an angle iron frame that was welded and bolted to the cement foundation. This was built in order to compensate for the expansion and shrinkage of the bricks during the firing process. After the arch bricks were laid and had cured the temporary plywood frame was removed and a large fire was built in the interior of the kiln as to speed the mortar's drying process.

After the arch was completed and support was achieved for the kiln the front and back walls were laid. Spy holes and spray ports were mapped out as well as building the kiln's bag wall in the interior. The bag wall is used to direct the flame from the burners into the radius of the arch thus creating a crossing draft. The bag wall is built free standing with no mortar out of hard bricks that were custom cut for this design aspect.

The next step was the construction of the chimney. This was the simplest task of the construction of the kiln. We calculated the size of the opening of the chimney and its height and tapering and laid it down with just hard bricks and three damper systems to control the kiln's atmosphere. These dampers allowed us to change the kiln's atmosphere from an oxidation to reduction atmosphere with ease and thus allowed precise kiln control.

The final stage of the kiln's construction was to put down a castable mortar roof that is insulated with a Kaowool blanket that is laid over the arch brick. The fiber blanket is fire retardant material used as insulator to maximize the containment of heat in the kiln. This aspect of the design allows for a stronger insulation of the heat produced thus being cost and time efficient. The castable mortar was reinforced with wire mesh fencing and then cured with venturian burners that heated and sealed the mortar mix. We also lit another small fire in the kiln to dry the mortar out at both ends, and this brought the kiln's construction to an end.
Over the course of five weeks we designed and built the kiln and spent time in the studio producing work and preparing a few glaze recipes to run in the preliminary test firing. During this time in the studio I concentrated on mastering ceramic forms I had previously studied. This allowed me to establish a refinement in the technical aspects of creating these forms. These forms were made using the wheel thrown process and were done with several different stoneware bodies that are conducive to reduction firings.

The test firing began at around seven in the morning and finished around two thirty the following morning. All of the ceramic ware was loaded the day before. During the course of the firing we experimented with controlling the kiln's atmosphere with the damper systems while recording the burning of fuel amounts in comparison to the increases in temperature. Control was established throughout the kiln firing and a true reduction atmosphere was achieved. In light of all of the successes the desired temperature was never achieved. This was a disappointing aspect in that the works that we had created were ultimately destroyed and the glazes we used never matured due to the lack of temperature. On the other hand when opening the kiln, after a full day of cooling, we were able to see two primary faults in our design that are adjustable.

The first mistake we had made is that the forced air burner systems were too strong in relation to airflow. We documented that much of our heat was being forced out of the chimney as well as impeding our rate of combustion to create heat. This will easily be managed by incorporating a dimmer switch on the burner systems to slow the flow of air into the kiln. Secondly, the bag wall had spacers in the bottom course of bricks that were aligned directly in the path of the burner ports ultimately allowing the flame to barely cycle through the kiln but instead travel across the floor directly out of the chimney. This issue can easily be remedied by redesigning the bag wall and should only take an hour or so. The dimmer system is something that is being investigated at the moment and should be resolved once the parts come in. Both of these factors caused severe heat loss.
and a lot of wasted money in fuel expenses. The one major positive factor in spite of all this is that the temperature that was achieved was very close to our desired one. With this in mind these two minor adjustments should resolve these issues.

These past ten weeks has allowed me to grow my interest and develop understanding of my craft and my capabilities within it. I have had the opportunity to spend time freely as a researching ceramicist with only the responsibility to myself to focus and explore. I have strengthened my background in tradition, fundamental mechanics and processes, and ideals of community. I have also refined my overall craftsmanship in relation to wheel thrown ceramics as well as my understanding of kiln engineering and construction.

FUTURE WORK

It is my intention to take the next two semesters and further develop my understanding of both kilns that I have the opportunity to work with. I will use these specialized firing processes to develop my graduate portfolio work as well as to prepare for possible gallery showings. I will also continue to experiment with other firing techniques in workshops around the New England area as well as with my fellow potters. I also intend to continue to develop a series of glaze formulas that are complemented by both firing styles that I have investigated over the past two summers. This will enhance the quality of my portfolio work.

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REFERENCES


