ABSTRACT

Functional Ceramics

by

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As a potter who deals with consumer products, I use different approaches in my making process to practice methods that have less of an impact on the Earth's resources. In this thesis, I will be investigating two different perspectives to achieve this.

Repurposing once used vegetable oil as a fuel for firing the kiln and designing a burner that is efficient and reliable, I have attempted to lessen the impact that manufacturing ceramic pots has on the ecosystem. The values that I hold about the environment are reflected in the practice of making pots with an ethically sound approach.

Creating ceramic products that incorporate elements of play into the ergonomics of the pieces, I am investigating the concept of humor as a tool to establish better practices within my community. Using adapted methodologies, the ceramics vessels that I produce invite a communication to take place between the user and myself.

Functional Ceramics

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by

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Functional Ceramics

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DEDICATION

I would like to dedicate this thesis in memory of my grandparents and also to my parent's who always have supported me throughout my endeavors.

ACKNOWLEDGMENTS

I would like to thank my parents for their continued support through-out the thesis process. I would also like to thank my professors and the School of Art and Design for the technical and financial backing for building the Repurposed Vegetable Oil Kiln that will remain a part of the Ceramics program. I would like to thank Sarah Fish for all the graphics and emotional support. Finally, I would like to thank the local restaurants who donated used vegetable oil.

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LIST OF ABREVIATIONS

Recycled Vegetable Oil Kiln…… RVOK

Cubic Feet Per Minute……CFM

Round Kiln Brick……RKB

Functional Ceramics “A Journey Through the Making Process”

KILN BUILDING

The Repurposed Vegetable Oil Kiln (RVOK) that I built at East Carolina University was designed to use restaurant waste vegetable oil and create a more positive outcome for my making process. I built the kiln and burner system to encourage better practices within the ceramics field, creating less of an ecological impact on the earth. Creating pots that echo the concept of improving habits, I try to establish self-sustaining lifestyles that lessen our impact to the Earth.

It was my initial intent to build a wood kiln that utilizes vegetable oil to supplement the wood as a fuel source. The aesthetics I was trying to achieve require a long firing so that ash from the wood could land on the pots and slowly melt to a deep glaze that covers the exterior of the pot. For this reason, firing a wood kiln is not the most efficient in terms of fuel consumption. I decided to use vegetable oil that would otherwise be discarded after use to counterbalance the ecological damage wood-firing has on the Earth while still obtaining the aesthetic qualities of wood ash accumulation and the melt of glaze on the pots. The other factor that I wanted in the aesthetic was adding soda ash to the kilns atmosphere. This would brighten the glazes and make them move a bit more during the firing.

As this project continued, the direction for my research continued to develop with an ecological premise. This guided me away from the use of soda during the firing for the adverse effects that this type of firing has on the environment.

Earl

The first kiln I built, named Earl, was designed to use wood and used vegetable oil to complete the firing (See Photo 1). This kiln had six burner ports placed throughout the kiln. A firebox provided the combustion chamber where the wood was to be burnt, and the burner ports were evenly distributed along each side of the kiln including two in the firebox.

The original design for building of this kiln was based on a round kiln that was featured in Ruthanne Tudball's book "Soda Fired Ceramics". Round kiln bricks (RKB) that are high density and used by industry to line furnaces, were available and the design was geared at obtaining better soda results. This makes the bricks hard to heat, but once they are heated they retain the temperature for a long period of time. The plans were discussed in an open forum with Dan Murphy who visited ECU for a kiln-building workshop (See Photo 2). With the materials at our disposal for the first time, Murphy and I set up the footprint and got a general idea of how big this kiln would be. A leveled pad of cinder blocks was placed down which would remove the kiln from direct contact to the cement pad. After all the blocks were set, a layer of high insulating brick was placed on the floor to protect the cinder blocks from direct heat. Next a layer of hard brick

was placed in the ware chamber and an additional layer of hard-brick was placed in the firebox to absorb heat. The ware chamber is placed above the firebox with a step up to help direct the flame into the ware-chamber. The center of the footprint was established and a paper template was placed on top of the hard brick floor to map out the area of the ware chamber.

Mouse holes were incorporated into the floor of the firebox allowing better combustion to take place. Along the front side of the kiln, there are many primary airs placed in a staircase configuration, which allows ample air to enter at all stages of the firing. This staircase grate system also served as a platform for the wood to burn on. Once the walls on both the firebox and the ware chamber were four feet tall, a mold was built so a throat arch could be constructed (See Photo 3).

The throat arch connects the firebox to the ware chamber. This had to be thick because the intense heat from the firebox constantly travels through the throat arch into the ware chamber. This form serves the dual purpose of directing the flame and serving as an insulator for that portion of the kiln.

After the throat arch was completed, the walls were finished and skew bricks were fabricated from castable to set the proper pitch for the RKB arch that served as a roof for the kiln (See Photo 4). This was constructed using a form that supported the arch as it was being built. The form was removed prior to firing the

kiln. The firebox walls were completed and a form for the arch in the firebox was perpendicular to the arch in the ware chamber. I used castable to make the arch for the firebox and this form was burned out during the first firing

BURNERS

I have built and tested many different styles and adaptations of burners to fully combust the used vegetable oil. I built a variety of burner tips that would spray the oil using the pressure in the line or make the oil drip from different nozzles. Each burner provided valuable information that helped me evaluate and discover improved systems for providing the correct ratio of air to fuel.

Burner Plates

Problem: Use gravity to inject oil into the kiln via burner plates.

For the first firing in Earl, I chose to use burner plates (See Diagram 1). Three plates were welded together and arranged like a declining staircase with a minimal slope on each encouraging the oil to move slowly. Each step overlapped the previous one by three inches. This acts as a three-stage system to preheat the oil before entering the kiln. Each plate progressively was hotter in relationship to the distance to the burner port. The last plate the oil would hit was almost in the kiln. This system was dependent on gravity to deliver fuel for the kiln. During firing the burners did not have enough natural draft and the kiln lacked oxygen for proper combustion. I could not raise the temperature beyond 1940º F as the kiln stalled out after an exhausting 52 hours of burning. I determined that the burners needed more air so I decided to incorporate forced air in the next firing to obtain better atomization of the oil particles.

Forced Air Burners with Gravity Feed

Problem: Incorporate forced air to aide in the combustion of the fuel.

There are different options for combustion of the fuel when using forced air for firing. The first tip was built with a plug placed on the end of the copper tubing and multiple holes were drilled in the cap (See diagram 2). Set screws allowed for adjustments to be made to the direction of the burner tips. The air duct for this burner was simply a long pipe that fit snuggly onto the end of the blower. The oil for the burner was gravity fed from the 55-gallon drum that was eight feet above the kilns firebox. Since there was not enough pressure in the fuel lines to force the oil through, it did not spray and the first version failed.

Revision of Burner Tip

Problem: Encourage the oil to atomize using the pressure in the lines in combination with forced air.

Modifications were made and I changed the direction of the flow of oil in the second version. Instead of running the line horizontally, this tip directed the oil straight down the line and the tip was crimped to spray the oil similar to a showerhead (See Diagram 3). This version allowed for a reserve of oil to be abundant at all times, directing the oil straight out of the line. There was still not enough pressure in the line to spray the oil and the air supply, which is measured

in cubic feet per minute, (CFM) was not powerful. The next experiment was different blowers that had a higher CFM.

Introduction of New Blowers

Problem: Use more CFM to encourage better atomization of the oil.

I prepared a new burner system that needed to be tested, which had powerful blowers and a modified burner tip that required a change in the direction of the oil with an upward flow (Diagram 4). The catenary arch kiln, appropriately named Cat, is an existing gas kiln built from high insulating fire-brick. I used Cat as a test kiln and started the firing using the natural gas burners that are permanent. When I built the door, I configured ports for the oil burners and when a dull red temperature was gained in the kiln, I switched from natural gas to oil as the fuel source (See Photo 5). The kiln quickly gained temperature and was successfully fired in 8 hours to 2350 º F. This result was promising and I decided to fire the insulating fire-brick (hard-brick) kiln with these burners. The high refractory insulating brick kiln was used to test fire the burners and the results for this kiln were more efficient.

With similar firing schedules throughout the test firings in Earl, I started the firing with wood to gain a dull red temperature and as the hard brick was heated, and the kiln slowly raised temperature. This took approximately 24 hours for each firing. Once the temperature in the ware chamber past the stage of quartz

inversion at 1063º F, I put the oil burners in and switched over to the oil for firing. The initial switch was not smooth and the temperature loss was significant. This posed a difficult road block and made me reassess the connection to the tank, which was fashioned out of nylon tubing and attached to the copper tubing with hose clamps. The burners seemed to ignite the oil well, and the temperature slowly climbed back up. One of the burners near the door of the kiln got clogged and started to drip oil that never combusted. After enough oil was built up around the burner, it ignited and burnt out the blower. This led to another decrease in temperature. I replaced the blower and restarted the burner. It was hard to regain the temperature and after many more hours of frustration, the tank clogged and I shut down the kiln.

I set out to fire the kiln again after flushing the tank and filtering the oil. Each burner was aimed in the chamber in a staggered configuration. The burners each had a variation in the manner that the flame was burning and some were getting clogged.

Simplifying the burner tip

Problem: Refine design and make less obstructions for debris to get stuck in.

After talking with Seo Eo, ceramic area coordinator, I decided to try another version of the burner which was simple in design and had less constriction on the oil flow (See Diagram 5). Three copper wires coming out of the end in the shape

of teepee allowed the fuel to drip freely down each wire and as the forced air passed over, it blew the drips into the kiln. The oil drips had a spitting action, similar to the previous burner but without a compression tip, allowing more regulation of the oil distribution. This eliminated the clogging issue and allowed more fuel to enter the firebox if needed.

When this happened, the interior of the kiln looked foggy and resembled a reduction firing. I thought the kiln was burning dirty but the smell was not familiar. The vegetable oil has a distinct smell. When it burns it has a similar aroma to the food that was cooked in the oil. There was not a typical sweet smell that I associate with reduction, when there is an abundance of gas like I had experienced in gas kilns or wood kilns. When the oil drip was overabundant, the cinder blocks that hold the kiln off the concrete would smoke because the oil was leaking through the kiln floor, informing me that the fuel was not obtaining full combustion. I successfully burned the kiln to cone ten flat on top and bottom (See Kiln Chart 1).

When I opened the kiln, everything looked oxidized. The cone-packs, which were made of a stoneware body that usually turns grey to light brown in color when properly reduced, were a light tan color. The pots glazed with celadons came out a straw color and not the proper blue-green, which indicates a lack of reduction in the atmosphere. I thought the smoky cinder blocks might be a sign of reduction and this is what I planned for in subsequent firings.

Upon inspecting the kiln, I discovered that the burners had residual carbon on them and the three wires were bent further out. This led me to believe that the heat was close to the tips of the wire, softening the copper, which gets pliable at 500º F. This fluttering action seems to discourage the extra dripping and gathering of oil in the pipe during the firing. Monitoring the drip is vital and this burner configuration allows more control for distributing the oil.

After examination of the ware, I decided that this kiln would be the one used to produce pieces for my thesis show. This decision was based on the efficiency of the high insulating fire-brick and fact that I had fired this kiln to temperature multiple times.

FIRING THE CAT

I welded a 55-gallon drum above the kiln and placed it at an angle to prompt the oil to follow the lines at the bottom of the barrel. Attached to this line was a shut off valve. After the shut off valve, there was a tee intersection to allow two burners to be placed into burner ports that were built into the door. These burners are on quick release connections, which allow them to be removed easily when the kiln is not firing and during the piloting when the gas burners are being used.

Cat fired smoothly once the adjustments were made to the burners and screened oil was put through the lines. The smallest debris can get caught up in the lines and prevent the natural pressure from gaining any momentum. I had oil that was filtered through the Christy's Euro Pubs fryer. This oil seemed to be the purest (See the Restaurant Oil Grading Chart).

The tank was welded on top of the kiln at a height of 7 feet. Running copper lines from the tank, the plumbing started with ½ inch copper lines that were split with a tee intersection and run at an equal distance to each burner. Since the tank was located biased to the right side of the kiln, the piping was formed in a zig-zag pattern to compensate for the distance (See photo 6). This design

caused the lines to clog easily and during the firing, the pipes needed to be agitated to release the sediment.

The lines reduced down to ¼ inch at the burner tips where three copper wires extended outwards to guide the oil drips into the kiln. I aimed the trajectory of the drips to land about 1 foot in front of the target brick where they would combust. I observed that the oil was burning very smoky. I pushed the body reduction hard, to the point where I felt the kiln was over reducing, to compensate for the lack of reduction in the last firing. The fuel burned dirty and the kiln billowed black smoke from every nook and cranny. The reduction lasted for one hour in which time cones 010 to 01 were flattened. During this time period, the damper was shut to one inch and reopened to 1½ inches to bring the atmosphere to neutral. The rate of oil-flow was constant throughout the firing and the forced air was minimally adjusted during the reduction. The air-flow remained at ¼ inch opening to force the oil to land properly.

The kiln fired from cone 010 to cone 10 in four hours (See Kiln Chart 2). The glazes were matured and the reduction was better. Some of the glazes seemed to have pinholes. This was either caused by an inadequate bisque firing or the short cycle of the glaze firing, which could have caused insufficient melt in the glazes. For the following firing I planned to decrease the flow of oil by closing the main valve on the tank, which would reduce the amount of pressure in the lines.

My hope was that the restricted flow would lengthen the firing. During this firing, the weather was colder than the previous firings and the oil tank was half-full. Cold weather made the oil viscous, restricting the flow. Since the tank was only half-full there was less pressure in the line. These two combined factors constrained the flow of oil and the transition from gas to oil similar to the previous firings was hampered. Firing the kiln to cone 1 preheated the tank and lines enough and enabled the oil to flow freely. Once the oil was flowing and the kiln increased in temperature, the firing preceded as before. I was able to reduce the kiln with less fuel, which resulted in less black smoke. I also began to smell the reduction at the front of the kiln. Inside the kiln, the atmosphere was foggy at cone 8, which is an indication of proper reduction. The top of the kiln was hotter than the bottom by one cone difference and I decided to flatten the top cone and bring the bottom of the kiln to a soft cone ten (See Kiln Chart 3).

Completing the firing with oil after the switch at cone 1, the kiln fired off in an additional four hours. Slowing the pace, the kiln fired for an additional two hours compared to the rate of climb in the previous firing. Though the results are hard to compare since this firing was not similar to the prior firing, this was a positive direction to proceed. The next step in the process was to weld the tank directly above the kiln to benefit from the heat and to remove the zig-zag configuration of the oil lines.

After welding the tank centered above the ware chamber, the lines ran directly to the burners, eliminating constrictions along the way (See Photo 7). This provided a constant distribution of the oil and no clogging of the lines. Monitoring of the oil was still difficult, even with the main valve turned one quarter on, and the smallest adjustments in turning each individual burner valve resulted in a major increase in temperature. The Cat fired quickly through body reduction and made it to cone 5. I adjusted the oil so it would not burn as quickly, and this resulted in a loss of temperature. The color became dull orange instead of the brightness it has at cone 5. Increasing the oil flow a bit resulted in a huge temperature gain too quickly and cone 10 fell in one hour (See Kiln Chart 4).

The results were oxidized celadons and some blistering glazes. The firing went fast and was compromised from the mistake of not having a target brick on the left side. For the following firing, I decided to move the target bricks forward a bit to push the heat toward the front bottom of the kiln (See Kiln Chart 5).

A slower firing proved to allow for more glaze development, which was apparent in the melt of the glazes. There were fewer pin-holes, although some of the glazes did not fully melt at the seams of the attachments. The glaze was thick and pin-holes still showed up in these places. There was a depth to the translucent glazes that was more noticeable with the longer melt time, and possibly the hotter temperature. The glazes also seemed to react more with

each other. An improved body reduction was apparent in the cone packs where a stoneware body was used.

When I arrived in the morning to fire the Cat again, there was frost on the cars. The oil tank was warmer than the air and the oil was warming up. I switched to oil early on in the firing and brought it up slow. I used a pyrometer to measure the fluctuation in temperature. The climb was at about 100º F per hour, which is ideal. The kiln went through the beginning stages at a good pace, and when cone 010 dropped, I engaged the kiln into body reduction. I adjusted the several times until I got the combustion correct.

The kiln climbed quickly to cone 10 and I soaked it at the high temperature to get a better melt from the glazes (See Kiln Chart 6). When I opened the kiln, there was minimal reduction but the glazes were mature and had a good melt that appeared to have the development I was looking for.

Cat seemed to fire very slow or very quick. There was a very fine line of the amount of oil needed for a proper reduction that also had a slow climb. I found that a very smoky body reduction seemed to yield the best results and then a quick climb to cone ten or eleven with a hold to let the glazes develop was what I was aiming for.

Firing Cat again on a relatively warm day proves to be the best for low viscosity

of the oil. I found water in the line when I switched to oil and I concluded this was from the cooking of frozen products at the restaurants. The oil also seemed to be of a lower grade and came out thick. Once it heated up, the flow rate was great and it seems to go into reduction on its own as the oil heats up in the tank around body reduction, therefore increasing the flow (See Kiln Chart 7).

The results from this firing were muted colors and the top had a hard time reaching temperature. This was due to the loading and since there were large plates and the seder plates needed to span two shelves I could not stagger the shelves at the bottom which inhibited the heat from reaching the top easily.

The final firing of Cat started out slow, but at the high temperatures it once again gained momentum. I was able to pace the kiln through body reduction, but once cone five fell, the temperature gain was sudden. Within hours cone 10 was flat, and I shut the kiln down (See Kiln Chart 8). When I opened the kiln the glazes were melted properly, but one of the stilts was melted from the direct flame through the bag wall. This caused the entire front stack of shelves to shift and I lost some of the ware because it stuck to each other.

BODY OF WORK

Growing up, my household had paintings by Leslie Sue Chefer, my mother, that hung in the hallways along-side reproductions of modern art. The bold lines and seams that frame my work are directly influenced by the line work that inspired me from my mother's artwork and from the posters of modern art in our house. My pots are reflections of where I came from and the traditions from my upbringing. I am interested in the social implications that occur through the use of my pots. Framing the idea of function in a literal space, the user gets to participate in a sometimes awkward and **fun**ctional ceremony. Containment of space is expressed in two ways: the frames that are established by the solid line work in the pieces and the literal containment of food, beverage, or decor.

Relationships

Visual relationships are formed between the pieces via similar handles, spouts, feet, or other attachments, which have anatomical references and create a dialog between the objects. The space that the pieces inhabit is activated through their anthropomorphic features, implying a type of communication that is extended when the viewer becomes active in the dialog by using the pieces.

By throwing each pot in sections and making separate attachments for the spout and handles, I have the opportunity to make each piece unique. The pots have a personality through stylized spouts, feet and handles. I incorporate a tilt into the

design by offsetting the body of the pot from the foot, giving the forms an upward movement. This lean anticipates the function of the piece and aides in the pouring of the liquid while creating an ostentatious appearance. The handles mimic a tail and accent the curves that are present in the body and spout giving a balance to the visual weight. Maintaining elegance, the lines emphasize the curves and attachments while providing an outline and referencing cartoon elements, which implies play.

Exaggerated proportions and accentuated curves provide the object with humor, which references toy-like qualities and elicits a hands-on interaction. An opportunity to connect with the viewer is presented when the vessels are used for serving food or drink. As the individual consumes the comestibles and beverage, the action of tipping the mug, or lifting the lid activates the rattle in the piece. The visual qualities of the pieces may draw the user in, and when engaged with the piece, beads placed within the hollow handle cause a slight vibration adding another level of interaction.

Using humor, I initiate a dialog with the individual and through this communication a relationship is formed. These rattles suggest a fragile and intimate moment developed from the slight resonance of the beads against the pieces' surface. This recurs during use and is dictated by the maneuvers needed to consume the contents of the pot.

Communicating through these pots, the individuals may experience my concept of a dual function. As they pick up the pitcher, sound and a tactile movement emanate from the interior of the hollow handle and creates a soft vibration from the beads rolling along the interior of the handle. A soft satin glaze compliments the pot's rattle, giving it a sensual feeling as the reverberation entices the person to repeat the movement of pouring. These little secrets are revealed when the object is used inducing a moment of surprise for the user. This revelation invokes a unique communication, initiating mystery by offering the unexpected.

Another secret that I impart to the user lies within my mark. I press my fingerprint into the bottom of each pot, which becomes translucent due to the thinness of the porcelain. This minimal use of material echoes the fragility of the environment reminding the viewer how gingerly we should approach the Earth.

Ecology

My motivation for producing these pots is to express concern about environmental issues that are common today in United States society. I strive to create environmentally conscious studio practices that reiterate the social happenings I construct. If the product is made and used while promoting better habits it becomes more desirable. A sustainable object, which addresses ecology and social awareness, can motivate better living habits if it seamlessly migrates into the social structure without slowing the current pace of life.

Participation in these occurrences can lead to a better understanding of others in our community. By engaging the social aspects of civilization, I initiate a communication with people, which levels the playing field.

This concept of use and reuse maintains a trendiness, making it the piece's function, and suggesting lifestyles that can utilize ceramics. Stylistic pieces that relate to modern times can encourage sustainable practices if the production and disposal cycle does not harm the environment. Through sales at commercial galleries, the farmers market, and other public venues, I have access to the public.

I engage humor by using the positive frame of mind, as an entry point to address environmental issues. Using the pots in a social atmosphere brings up many issues. The environmental impacts of mining the material the pots are constructed of, and firing them and making them permanent objects in the world are avenues to explore. Recognizing the negative aspects of the materials' life cycle while establishing better practices in my studio helps to initiate an exchange of ideas about environmental issues. Choosing to fire only the best pots is one decision that I make guiding me towards making each pot inimitable and more sustainable.

Ceremonies

Social happenings are where I intended the pots to be used. The pots provide the tools necessary to begin conversations about ecological issues and confront them in a humorous manner. These pieces are designed to stimulate conversation and provoke social awareness. Using improved methods to create ceramic ware, these community-based gatherings invoke the first steps necessary to creating a better view of the Earth. This could help change our perspectives, which are currently destroying the Earth.

Seder Set

Passover is a ceremony in which I have participated in since I was born. Every year my family gathers around the dining room table where we participate in reading the haggadah, which is from the book of Mishnah, or the oral tales of the torah. The haggadah tells the story of the Jews' exodus from Egypt. My father leads the narrative with his typical humorous satyrs, guiding us through the seder, which is a ceremonial meal held on the first two nights of Passover. The seder set that I created is composed of a seder plate, six table settings that include kiddish cups, plates and bowls, a kiddish cup for Elijah, candle holders, a matzah plate, and two small bowls that hold the salt water. These elements represent the fundamental objects needed for the ceremony in which my family participates.

A seder plate holds different items that outline the symbolism of the Passover seder. *Charoset* (a mixture of wine, apples, nuts and spices) is symbolic of the mortar the Jews used to build with while enslaved by the Egyptians. *Baytzah* (a hard- boiled egg) denotes a symbol of life and the perpetuation of existence. *Zeroa* (a shank bone) represents the Paschal lamb offered as the Passover sacrifice in Temple days. *Karpas* (parsley) stands for hope and redemption of the Jewish people and was as an appetizer in ancient times. *Maror* (horseradish) signifies the bitter life the Israelites had while enslaved in Egypt. Finally *Chazeret* (salt water) denotes the tears of the Jewish slaves. All of these items are present on the seder plate at my parents house and through the telling of the Passover story, each one of these articles helps to articulate and guide us through the meaning of Passover.

Kiddish cups accompany each place setting and represent the four glasses of wine consumed during the narrative. The seventh cup for Elijah symbolizes the prophet who is the guardian angel for the Jewish people. In the story of Passover there are four sons. Each son is depicted in their own manner and represents different characteristics that reveal the Passover story. One son is wise, one is rebellious, one is simple, and one is too young to know how to ask the question of what Passover is. While there are many different interpretations as to the meaning of each son, the sibling rivalry always included the subject of who the simple son was. The Passover story

identifies me as Jewish, and I wanted to take the elements that made our seder table different from other families. The rich bold lines, bright colors and goofy styles of cups, plates, and bowls identify my family with the humorous style of seders practiced in my family. While a serious underlying theme brings us together, the gathering of my family was the most significant role this holiday has.

Candleholders contain the sabbath candles that are lit at sundown and signify the beginning of the holiday. The Matzah plate holds the unleavened bread, which serves as a reminder of the haste with which the Israelites fled Egypt, leaving no time for dough to rise.

Through this illustration of my family I set the table for six of us and placed my father's chair at the head of the table. This chair has a pillow in its seat in a reclining position symbolizing a free person who is relaxed. The dinnerware set is special and different from the everyday dinnerware and reserved for use on this holiday only.

Mojito sets

The mojito sets are made with the intent to engage people in a fun social happening that promotes gatherings. My hope is that this social gesture will set the grounds for communication to take place. By creating an active experience that involves an assembly of people, I am encouraging relationships that could

persuade interactions between people who might not regularly meet. This creates a common ground that can eliminate hierarchies through an integrated leisure practice.

In the handles of the mojito pitchers, I have incorporated rattles that add an interactive element, presenting a sound that attracts the users' attention to the action of pouring. This component unifies the humorous nature of the vessel and its anthropomorphic qualities, giving the pot a "voice". With these subtle sounds, the action of pouring is accented and the person using the vessel interacts with the pitcher or cup on another level, which initiates humor and enjoyment.

The obviously absurd proportions of the spout and handles accent the humor that entices the person using the vessel. This adds to the manner in which it is handled where a two handed grip is need to control the pour. This furthers the group dynamic and encourages multiple people to participate in this ceremony.

Cups that are simple in form mimic the shapes created in the accompanying pitchers. These are finished with satin glazes that beckon to be held and caressed as the person drinks from the cup. The bulbous shape fits in to the hand and forces them to grip it in a manner different from other cups, since the bottom is smaller than the top.

Coffee sets

The coffee sets have coffee cups and cream and sugar containers that rattle with use. The coffee cups are designed to rattle as one sips coffee. The creamer rattles as one pours the cream and the sugar container has a spoon rest placed into the lid. These complete the set and visually fit into the arrangement using the same line qualities and forms as the cups. Coffee traditions in North America almost always include the use of cream and sugar. These containers persuade the people participating in the act to lift the vessel and use the contents.

People build a unique relationship with a cup that is both personal and special. This is achieved through the manner in which it is meant to be handled and utilized. At the most intimate moment, when the person places their lip to the vessel, the cup softly rattles insinuating a playful moment that can lighten the mood and project contentment.

Satin glazes that are soft encourage another form of communication when the person holds the cup and fondles the surface. This soothes the user and persuades them to cradle the vessel. Comfort and ergonomics vary from handle to handle depending upon the size and shape of each individual's hand. I anticipate this and create handles that fluctuate in dimensions, which also lends to diversity in the group ensemble. I enjoy the ability to communicate through elements of surprise and achieve this using rattles, curvaceous forms, soft glazes

and intensified lips, spouts and handles. The liquids pour off the spouts in an exaggerated manner that magnifies the action of pouring and therefore exploits the act of containment.

Hummus dip and vegetable plates

The hummus dip and vegetable plates stack unevenly and are placed on top of each other in a pile, which is meant to imply a diverse gathering. The portions of hummus to vegetables or pita are based on a single serving. These plates are constructed to keep the dip in a separate place and allow easy access to dipping the food. Ergonomics play an important role in the fabrication of the form and aide in the performance of the piece, allowing a comfortable grip on the plate while dipping in the hummus with the other hand. The function of dipping is dealt with in the shape of the bowls, which are constructed with shallow walls and a large lip that aides in placing the hummus onto the pita or vegetable. The smooth transitions of the form guide the fingers and persuade the user to nestle the plate in between their fingers, while the shallow valley creates a place for the hand to rest.

Another opportunity to communicate a message to the consumer is through food. Providing a healthy source of food, and a different way of consuming it enables one to carry the plate and socialize while eating good, healthy food.

CONCLUSION

The anthropomorphic qualities of my pots allow them to interact with each other, forming a dialog that tells a story. Alluding to an interaction the person might have had with a toy such as a stuffed animal or a doll in their childhood places the viewer in playful mood. With a sense of familiarity, they are more open to the ideas presented.

Any interaction that takes place between the pots is implied, but the implication of action guides the viewers' imaginations and plays with this notion. Play is an important theme throughout my making process. I have fun while making the pots by incorporating these unexpected intimate moments. Whether it is the lip of a cup, a rattle in the handle, or a surprise underneath, these components make the experience individualized. The personified pots create a dynamic that challenges the user conceptually. This creates an exchange of ideas between the individual who is interacting with the work and me.

Each ritual depicts a certain part of a lifestyle that can lead to better tendencies that do not have a negative impact on the Earth. Spirituality, social awareness, domestic routines, and dining are segments of life that can be practiced in a manner that helps instill a healthier existence.

The oil kiln proved to be a useful tool in guiding me towards a more

environmentally sound process. Weighing out the pros and cons of using vegetable oil as a fuel source has led me to believe that there are better solutions to make ceramic ware that has less of an impact on the environment. Factors that I considered were the time and labor spent refining the oil, byproducts of refinement and the carbon output it causes when firing. A majority of my time and efforts were expended gathering and refining the oil. Many of the restaurants reused the 5-gallon containers that the oil came in to hold the waste oil generated from their fryers. The containers had to be discarded because they cannot be recycled due to the food content in them. Oil is a dirty fuel when it is burned and creates a lot of smoke in the act of combustion. This smoke is visible and I would have to breathe it in while doing adjustments to the kiln. I plan pursue other ways to have less impact on the environment while making ceramic ware. In conclusion, I plan to use local materials and change the temperature of my firings to compensate for the carbon footprint I create.

By improving the production methods in my studio and making them less detrimental to the environment, I am attempting to reexamine the practices that are widely used in the ceramic field. I strive to make a sustainable product to initiate better routines in my community. Beginning to make products that instigate better solutions, my work is a step in the right direction.

REFERENCES

Hammer, Frank., & Janet. (2004). The Potters Dictionary of Materials and Techniques, Fifth Edition. University of Pennsylvania Press.

Tudball, Ruthanne. (1996). Soda Glazing, University of Pennsylvania Press.

APPENDIX

PLATES

Seder set

Mojito sets

Coffee sets

Hummus and vegetable dip plates

DIAGRAMS

Diagram 1 –Plate Burners

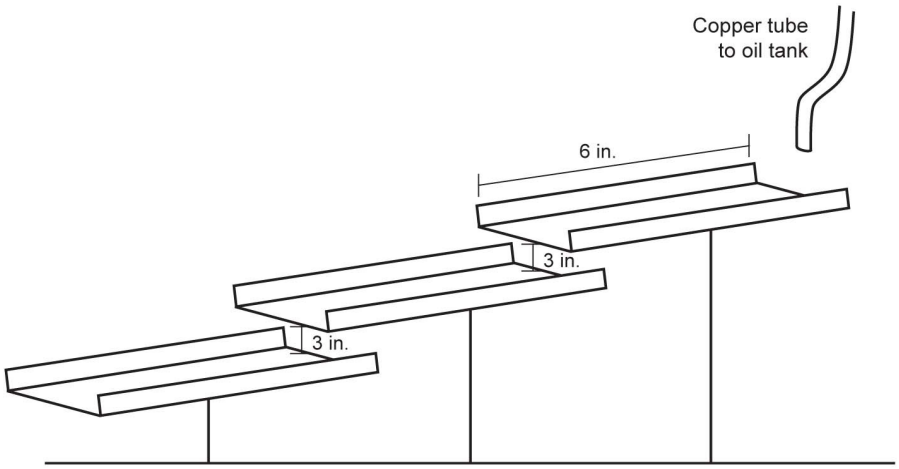


Diagram 2 –Drilled Holes Forced Air Burner

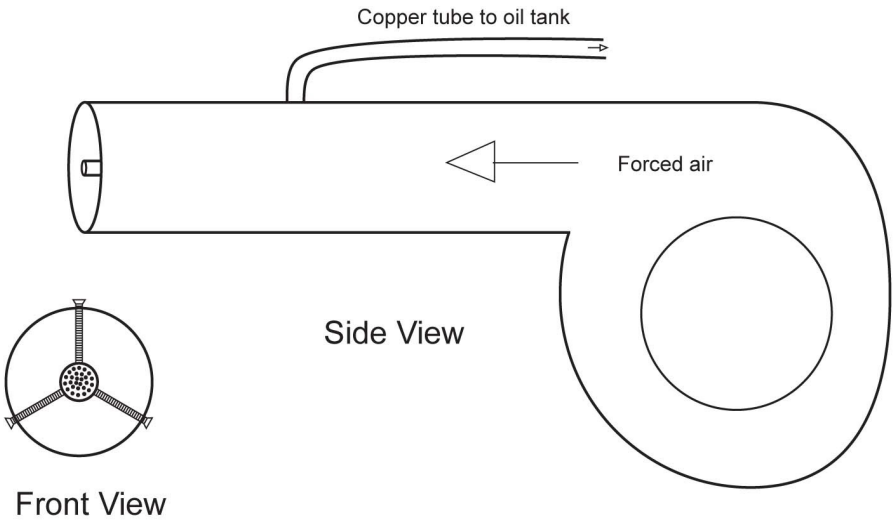


Diagram 3 – Shower Head Forced Air Burner

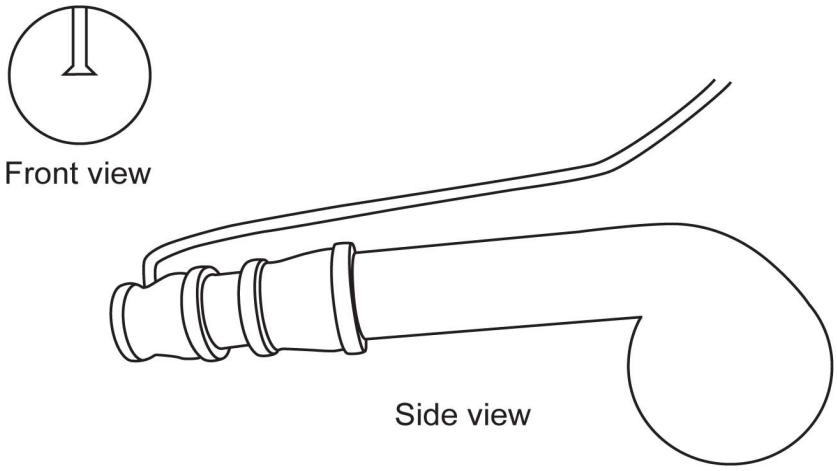


Diagram 4 – Upward Oil Feed Forced Air Burner

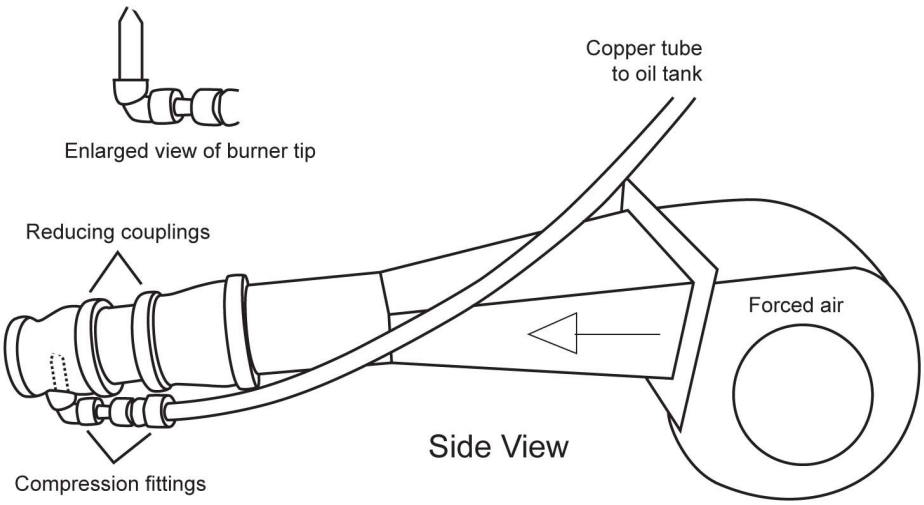
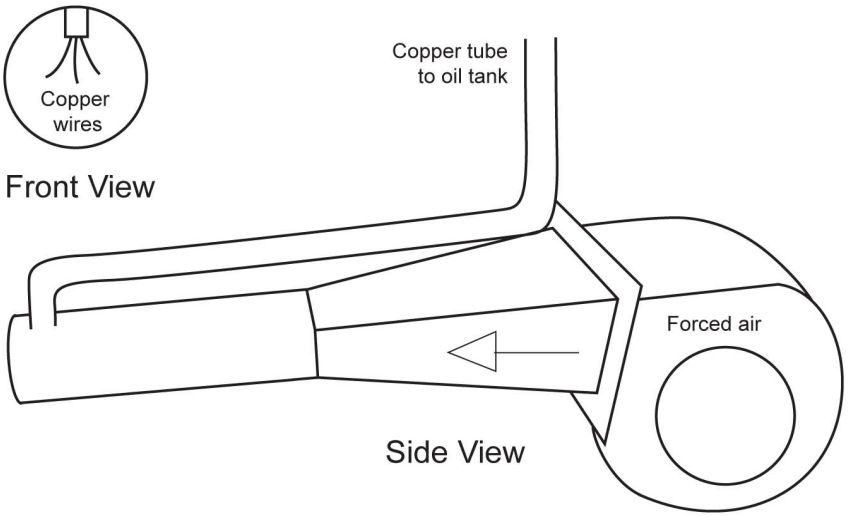


Diagram 5- Three Wire Forced Air Burner



Glossary

The Potter's Dictionary of Materials and Techniques *

Body Reduction- This refers to the atmosphere in the kiln at the temperature where the clay body is affected. It is visible and I use this as a tool to gage what type of firing I was obtaining. *See reduction firing*

Burner Port- Place in the kiln where the burner tips are aimed to allow access for the fuel to enter the interior of the kilns combustion chamber

Castable- Similar to a clay body; a refractory material composed of fire clay, course grog, alumina, sawdust and Portland cement that is used to build kilns with and can molded to create an insulation for the kiln.

Clay body- A specific formulation of clays, fluxes, and fillers combined for a specific ceramic purpose.*

Corbel- Bricks that stack on top of each other but are off set to form a wall that forms an arch. Each corresponding brick is supported by the brick below and the majority of the weight is placed on the brick below while a portion extends off the edge.

Fire box- Place where the combustion of fuel takes place inside the kiln.

High Refractory Insulating Brick (soft brick)- These bricks are 60 - 85 % lighter in weight than fire bricks, and can withstand temperatures 2300 degrees F, and quickly heat and cool, reducing the amount of time and energy needed to heat a kiln.*

Insulating Fire Brick (hard brick)- A heavy brick that absorbs very little heat and rated in four different types that vary in temperature ranges. This kiln used super high alumina hard bricks, which are rated for the extreme temperatures and long time periods that are present in wood firings.*

Mouse hole- A vent that is built into the floor used to introduce air into the kilns firebox

Oxidation firing- A firing method that has sufficient air in the atmosphere, which allows the glaze to oxidize (burn), or not lose the oxygen atoms already bound into their molecules.

Peep- A place where one can view the pyrometric cones used to gage the temperature in the kiln. This is also referred to as a spy.

Pin hole- A hole created in a glaze surface from a burst bubble that had insufficient time to heal over during the firing. This is considered a glaze defect.

Quartz Inversion- The temperature when cristobalite changes and a sudden expansion or contraction takes place. This happens between 1023ºF and 1063ºF in the rise and fall of the temperature.*

Semi-porcelain- Clay body composed of kaolin, ball clay, feldspar, silica and bentonite

Reduction firing- The atmosphere in a kiln which has insufficient air to support complete combustion. Carbon is created and this affects the surface of the glaze by forcing the oxygen atoms to give up their oxygen to the atmosphere.*

Refractory- An adjective that describes a material that has a high melt temperature.

Stoneware- Clay body composed of fire clay, ball clay, feldspar, silica, and grog

Throat Arch- A passage that directs the flame from the firebox to the ware chamber.

Ware Chamber- The inside portion of a kiln where the pots are placed and fired.

Restaurant Waste Vegetable Oil Assessment

Chico's Restaurant- Oil leaves the finest particles of residue once it has been filtered through a 70-mesh screen. Oil is very dark, and it has about 1/6 sediment on the bottom of the 5-gallon containers used to store oil in. It also takes the longest time to filter without any agitation. Once the oil settled after two months, it was dark clear on the top half of the container, and foggy from the sediment in the bottom half.

Christy's Euro Pub- This oil is filtered at the restaurant though a disposable filter so they can reuse the oil. When I receive the oil, it has been placed back in the 5-gallon containers it came in. There are only large thumbnail size particles that get filtered out by the window screen. The remainder of the oil does not leave any residue on the screen and flows through without obstruction. The color is dark brown.

Starlight Cafe- The oil is collected over the span of a month in 5-gallon containers that it came in. I supplied a screen and funnel that is used when the oil is transferred to the storage containers. I send it through the 70-mesh screen, and there is very little debris or sediment left on the screen. The color of the oil is medium to dark brown.

Mi Cabaña- The oil was collected in a 35-gallon drum and stored for one month outside the restaurant and then collected and transported back to ECU. Sediment has settled to the bottom and the remainder of the oil was fairly clean. This oil is dark brown in color.

Armadillo Grill- The oil was collected in 5-gallon containers it came in. There is fine sediment in the oil, and no pre-filtering was done. The oil seems to go through the screen easily with little resistance. The oil is dark brown in color.

Sup Dogs-The oil was pumped from the holding tank. The oil is changed as needed and not screened. There was large debris such as napkins and straws. The oil has a lot of sediment and was thick and the smell was noxious. The oil is dark brown in color.

Kiln Chart 1

Repurposed Oil Kiln Log 10-12-10

Time	Left Burner	Right Burner	Damper	Comments
3:00 P.M.	pilot	pilot	3+	first test on 3-wire burner, no tank used, five gallon receptacles refilled throughout firing
6:30 P.M.	turn up gas	turn up gas	3+	blue flame
9:30 P.M.				SWITCH TO OIL, not enough heat on left burner, just smoking
10:30 P.M.	slow drip, air ¾ open	slow drip, air ¾ open		seems like a small intense flame, seems to spit fuel, very smoky, good back pressure from top spy and feel heat from bottom spy, trajectory is important, aim burners at a slant,
12:00 A.M.	burner fail	burner fail		screens in container clogged, punch hole through screen
1:30 A.M.	burner fail, open ¾	air ¾ open	1	L burner went out, cut fuel line so direct path, seems like a better burn, seems to increase heat, flame is brighter
3:51 A.M.	air ⅓ open	air ⅓ open	½	∆010 @ 2:00- top, ∆010 almost touching down close air, close damper to start body reduction, flame licking out of bottom peep
5:30 A.M.	lot of oil spray	lot of oil spray		∆02 flat, ∆4 no melt – top, ∆02 @ 3:00 – bottom, using screened greese and burners are working better
6:30 A.M.				add more oil, need to maintain pressure, fill containers every half hour
7:00 A.M.	turn up a bit	air ¾ open		
7:30 A.M.	air ⅛ open	air ½ open, less oil		L burner seems to burn cleaner, spits oil in and is inset a bit, carbon build up, R – burner, back pressure at burner port, flame is bright yellow and smoky, back off oil and looks more like L
7:54 A.M.			1	cloudy inside kiln, open damper and push heat up
11:00 A.M.			¾	fill oil with 15 gallons, push damper in
12:15 P.M.			¾ +	pull damper out a bit, clean up atmosphere and raise temperature
1:00 P.M.				∆8 @ 3:00 – top, ∆9 @ 1:00 - bottom
1:25 P.M.				∆10 @2:00 – top, ∆10 touching down – bottom
2:00 P.M.				∆10 touching down – top, ∆10 flat – bottom SHUT OFF

Kiln Chart 2

Repurposed Oil Kiln Log 11/9/10

Time	Left Burner	Right Burner	Damper	Comments
8:00 P.M.	pilot	pilot	2	candle with gas
12:30 A.M.				turn slightly yellow
8:00 A.M.	¼ gas ⅛ air	¼ gas ⅛ air		turn up to blue flame
2:00 P.M.	gas ¼ oil 1	gas ¼ oil 1	1	reflective color starting, TURN OIL ON
3:30 P.M.				TURN GAS OFF, smoky, burning through floor, nice color developing
4:00 P.M.	air ½	air ½		Δ010 flat - top, Δ010 flat - bottom
4:20 P.M.	turn oil down, air ⅛	turn oil down, air ⅛	>1	Δ04 soft top, Δ04 touching down bottom, cut oil back
6:40	air ½ open	air ½ open		L burner went out, turn up enough to have back pressure, flicker out of top spy, light smoke from door and chimney
7:40 P.M.	flame 9” +	flame 9” +	<1	Δ01 touching down, Δ4 soft, Δ6 no melt – top, Δ01 touching down, Δ4 soft, Δ6 no melt - bottom
7:56 P.M.	turn oil down, shut air a bit	turn oil down, shut air a bit		Δ6 @3:00 – top, Δ6 Almost touching – bottom
8:20 P.M.	shut air a bit	shut air a bit	almost closed	Δ8 @1:00 – top, Δ8 soft – bottom, oil burning clean, still smoky, back pressure in burner ports, fire licking at bottom peep, glaze reduction
8:51 P.M.	open air a bit	open air a bit	½”	was burning clean
9:22 P.M.	close slightly	close slightly	¼”	Δ9 soft – top, Δ9 @ 2:00, Δ10 no melt – bottom, smells like reduction at flue run, front smells like oil smoke, slight reduction smell, bit of back pressure at burner ports, mostly smoke, 5” flame at top peep, flame aggressive lick at bottom peep
10:17 P.M.				Δ10 @ 2:00 – top, Δ10 @ 2:00 bottom SHUT OFF

Kiln Chart 3

Oil Kiln Log 11/29/10

Time	Left Burner	Right Burner	Damper	Comments
12:00 A.M.	pilot	pilot	3+	tank is full, chilly weather
9:00 A.M.	gas ⅛	gas ⅛	3+	
12:00 noon	yellow flame	yellow flame		
3:00 P.M.	turn up	turn up		
6:00 P.M.	turn up	turn up		reflective color developing
8:00 P.M.	air ½ open	air ½ open	1	SWITCH TO OIL, smooth transition
9:30 P.M.	air ½ open	air ½ open	½	∆010 flat- top, middle, and bottom, very smelly and smoky, close damper a bit to get reduction, black smoke
10:00 P.M.	lot of oil spray	lot of oil spray		black smoke billowing out of the bottom peep, flame is 1' + on bottom peep, ∆04 soft on bottom, ∆04 bending on top and middle
10:20 P.M.			1 ½	open damper, ∆4 @2:00 on bottom, no bending of cones - top or middle
12:00 A.M.	close a bit	close ⅛	1	push damper in, ∆10 soft – top, ∆10 flat on bottom and middle, go into reduction for ten minutes
12:00 A.M.				SHUT OFF

Kiln Chart 4

Repurposed Oil Kiln Log 12/7,8/2010

Time	Left Burner	Right Burner	Damper	Comments
8:00 P.M.	pilot	pilot	3+	tank is ½ full, cold outside
2:00 A.M.	gas ⅛	gas ⅛	1	
5:00 A.M	blue flame	blue flame		
8:30 A.M.	turn up	turn up		reflective color starting
12:00 noon				SWITCH TO OIL, starts o.k. but keeps going out throughout day, bang on the pipes, pipes are cold,
5:00 P.M.	wide open	wide open		SWITCH BACK TO GAS, oil is too thick and viscous
7:00 P.M.	air ¼ open	air ¼ open	1 ½	SWITCH BACK TO OIL, tank is warm
8:00 P.M.	oil drip is small	oil drip is small	2	oil slowed, tapped on line and seems to be flowing well again, lot of back pressure at burner ports, turn air up so pushed oil inside of kiln, burning bright yellow/ white, smoke and flame out of top front and back
8:30 P.M.			1	∆6 touching down bottom, ∆9 touching down top, push damper in a air down
8:50 P.M.	close a bit	close ⅛	¾	push damper in a bit more, smoky and foggy inside, try to push heat down
9:16 P.M.				∆10 touching down top, ∆9 at 2:00 bottom
9:30 P.M.				∆10 flat top, ∆10 just soft bottom SHUT OFF

Kiln Chart 5

Repurposed Vegetable Oil Kiln Log 3/12,13/2011

Time	Left Burner	Right Burner	Damper	Comments
11:30 P.M.	pilot	pilot	3+	clear night- slightly cloudy
5:30 A.M.	air ¼ open	air ¼ open	3+	nice blue flame with a flicker, try to heat chimney
8 A.M				turn up to solid blue flame
10 A.M.	close to ⅛	close to ⅛	3-	longer flame and more steady, reflective color starting in firebox
11:25 A.M.			2 ¼	push damper in for back pressure, color forming in firebox
1:09 P.M.	open 1”	open 1”	2	SWITCH TO OIL, Main tank on ¼ turn on, R and L valves turned to 1, drip is coming from wire intersection on L- burner, drip on 2 wires on R- burner, black smoke from top and bottom peeps
2:00 P.M.				open forced air a bit, had to adjust R- burner and open a hair (seemed clogged) This cleaned up smoky peeps, dull red color on top, hardly red on bottom
3:10 P.M.	open air a bit	open air a bit		∆010 flat on top and bottom, went into reduction on its own, R- burner was flowing more, oil might have been less viscous because of heat, smells like reduction, smoky out of top of door
3:53 P.M.				∆01 flat, ∆5 @3:00 on top, ^01 flat, ^5 no melt on top, slow the air and oil flow, slight burn in firebox, seems to be declining in temperature
5:25 P.M.	open oil a bit	open oil a bit		increase oil, full splatter, just past 1, bright yellow flame, not very smoky
6:30 P.M.		open oil a bit, open air ½ “	2 ½	try to get clean bright yellow flame
8:40 P.M.	open oil & air a bit	open oil & air a bit		∆5 @3:00 top, ∆5 @ 1:00 bottom, open air to about ½ “ open to push oil into burner port, back pressure at burner ports, a bit smoky, fire licking out of top of door
9:08 P.M.	shut a bit	shut a bit	2 ½ -	∆8 flat,∆9 @ 2:00 top,∆8 2:00, ∆9 no melt top, shut air and damper a bit for glaze reduction
9:28 P.M.	wide open	wide open		∆10 flat top, ∆10 2:00 bottom, open air to brighten color
9:35 P.M.				SHUT OFF

Kiln Chart 6

Repurposed Oil Kiln Log 3/ 28-29/ 2011

Time	Left Burner	Right Burner	Damper	Comments
8:00 P.M.	pilot	pilot	Open	cold night
9:30 P.M.			4+	turn up to blue flame
8:30 A.M.			4+	frost on cars
10:00 A.M.	turn up	turn up		
1:21 P.M.	turn up	turn up	2 ½	reflective color developing
3:31 P.M.	air ½ open	air ½ open	2	SWITCH TO OIL, reflective color starting in chamber, main tank on ⅛ turn
5:22 P.M.	air 1 open	air 1 open	2	clean up smoke
5:58 P.M.	.5+ oil 1" air	1.25 oil 1" air	2 ¼	pull damper out a bit to clean atmosphere, god back pressure in bottom peep 960º F
7:00 P.M.			2 ½	dull red/orange- top, dull orange on bottom, 1108 º F
8:00 P.M.	1 ⅛ air	1 ⅛ air		good clean flame contained in firebox, 1234º F
9:09	1 ¼ air	1 ¼ air`		keep fire clean- bit smoky near burners ∆010 soft - top
9:19 P.M.	1 ⅜ air	1 ⅜ air	1 ⅛ air	∆010 touching down – top ∆010 @ 2:00 – bottom, body reduction
9:48 P.M.				∆04 soft – top, ∆04 no bend - bottom
9:54 P.M.	turn oil down, ¾- air	turn oil down, ¾- air	1+	∆04 flat – top, ∆04 soft – bottom, 1630º F
10:10 P.M.				∆04- touching down – bottom, 1612º F
10:40 P.M.	1 ⅛ air	1.25 oil, 1 ¼ air`	1+	∆01 soft- top and bottom, oil igniting past wall in firebox, no flames from either peep, definite back pressure 1551º F
11:30 P.M.	bump oil up	increase oil, 1 ¼ air	1 ½	clean burn when I arrived, after turn up a bit smoky, flame from top and bottom peep equal, ∆01 @ 2:00 – top, soft on bottom, 1618º F
12:21 A.M.				∆01 flat – top and bottom, ∆5 touching down – top, 1882º F
12:46 A.M.	turn oil down	turn oil down	1-	∆9 @2:00 – top, ∆9 @3:00 bottom
1:09 A.M.	⅝ air	⅞ air	1-	try to slow temperature and reduce, flame from bottom peep
1:15 A.M.	⅝ air	⅝+ air		
2:23 A.M.				SHUT OFF, ∆10 touching down – top, ∆10 flat - bottom

Kiln Chart 7

Repurposed Oil Kiln Log 4/3/2011

Time	Left Burner	Right Burner	Damper	Comments
8:00 P.M.	pilot	pilot	Open	cool evening scattered clouds/ rain
10:00 A.M.			3	60º F outside
4:29 P.M.	turn up	blue flame		
6:15 P.M.	1- oil ½ -air	.25 –oil ⅝ air	2-	SWITHCH TO OIL- water in the lines and steam went into the bunner ports, 1108 º F
7:20 P.M.	.75 –oil 1 ¼ air	.25 –oil ¾ air		many adjustments to oil, Left keeps going out, 1308º F
7:38 P.M.	.5 –oil 1 –air	.5 –oil ½ + -air		∆010 no melt – top, ∆010 @ 3:00 bottom, seems to go into reduction own its own, smells reduc. , flames -top and bottom peep, windy 1490ºF
7:46 P.M.	.5+ -oil 1 –air	.5 –oil ½+ -air	.5-	∆010 touching down –top, ∆010 flat bottom, black smoke billowing from top and bottom peep
7:58 P.M.	.5- -oil ¾ -air	1 – oil ⅜ -air	2-	try to keep in reduction for body, bottom peep smoky, flames licks, 1583º F , 1609º F ,@8:06 P.M.
8:45 P.M.		clogged		tap on lines to clear out, ∆04 touching down –top, ∆04 @1:00 – bottom, fussed with oil and temp. dropped from 1655º F to 1630º F
9:15 P.M.	.5 –oil 1 ⅝ air	1 –oil ⅜ -air	3-	cleaner burn- smoke from flue run and top of door, 1672º F
9:50 P.M.	.5+ -oil	1 ⅕ –oil		lines clogged, bang on pipes, ∆01 no melt- top, ∆01@1:00 bottom, 1690ºF
10:15 P.M.	1- oil 1 ⅛ -air	1 –oil 1 ⅜ -air	3 ¼	open main tank ¼ open because it keeps clogging, 01 soft- top, ∆01 flat – bottom, 1746ºF
10:45 P.M.	.5+ -oil ⅞ - air	1+ oil 1 ⅛ - air	4	∆5 touching down – top, ∆10 touching down- bottom, pull damper out to bring flame to top
11:30 P.M.	1 ⅜ -air	1- oil 1 –air	3	push damper in to get reduction and bring heat to top, ∆5 touching down –top, ∆10 touching down, bottom,
12:00 A.M.				can't see into burner port on right, lot of back pressure, smoky and fire out of top and bottom peeps, ∆11 flat -bottom, ∆9 flat, ∆10 soft -top
12:20 A.M.	.5- -oil 1 ½ -air	1 –oil ¾ -air	3	∆10 touching down, ∆11 soft –top, ∆11 flat – bottom, bright white heat, push oil back a bit, 2043ºF
1:05 A.M.				SHUT OFF

Kiln Chart 8

Repurposed Oil Kiln Log 4/6/2011

Time	Left Burner	Right Burner	Damper	Comments
9:30 P.M.	pilot gas	pilot gas	5	clear and chilly
8:00 A.M.	turn up gas	turn up gas		
9:30 A.M.	turn up gas	turn up gas	2	
12:15 P.M.	.5- -oil ⅝ air	1 –oil ⅝ air	2	SWITHCH TO OIL- orange flames burning slightly dirty, past kiln wall
1:00 P.M.				right burner spitting, hardly any flame, 331ºF
1:49 P.M.	.5- –oil ⅝ air	1+ -oil ⅝ air	2-	right burner still spitting, turn up a bit, dull orange inside, 462ºF
2:23 P.M.	1 ⅛ air			right burner went out again, bang on pipes, left burning dirty
3:30 P.M.				1264ºF
4:30 P.M.	¾ -air	⅝ air	1 ¾	∆010 flat –top and bottom, go into body reduction
4:43 P.M.	.75 –oil 1 ¼ -air	1 –oil ⅜ -air	1 ¾	bump oil to get flame to top peep
5:00 P.M.				∆04 flat –top, ∆04@ 3:00 -bottom
5:10 P.M.				∆01 touching down –top, ∆01@ 1:00 bottom, out of reduction
5:22 P.M.	.5- -oil 1 ¼ - air	.75 oil ⅞ - air		bump oil back 1768ºF
6:18 P.M.				∆5@ 1:00 –top, ∆5 touching down- bottom
6:42 P.M.	.25+ -oil 1 ⅛ air	1 ¾ -air	1 ¾	
7:58 P.M.	.25+ -oil 1 ¼ -air	¾ -air	2+	∆9 touching down –bottom, ∆8 soft –top, pull damper out to bring heat up
8:30 P.M.				∆11@ 2:00 top, ∆11 @ 2:00 bottom, SHUT OFF

Orton Cone Chart

Cone Number	Cone Temperature
019	1249 ºF
018	1314 ºF
017	1357 ºF
016	1416 ºF
015	1450 ºF
014	1485 ºF
013	1539 ºF
012	1576 ºF
011	1603 ºF
010	1648 ºF
09	1683 ºF
08	1728 ºF
07	1783 ºF
06	1823 ºF
05 1/2	1854 ºF
05	1886 ºF
04	1940 ºF
03	1987 ºF
02	2014 ºF
01	2043 ºF
1	2077 ºF
2	2088 ºF
3	2106 ºF
4	2120 ºF
5	2163 ºF
5 1/2	2194 ºF
6	2228 ºF
7	2259 ºF
8	2277 ºF
9	2295 ºF
10	2340 ºF
11	2359 ºF
12	2379 ºF
13	2410 ºF

PHOTOS

Photo 1 - Earl

Photo 2 – Plans for Earl

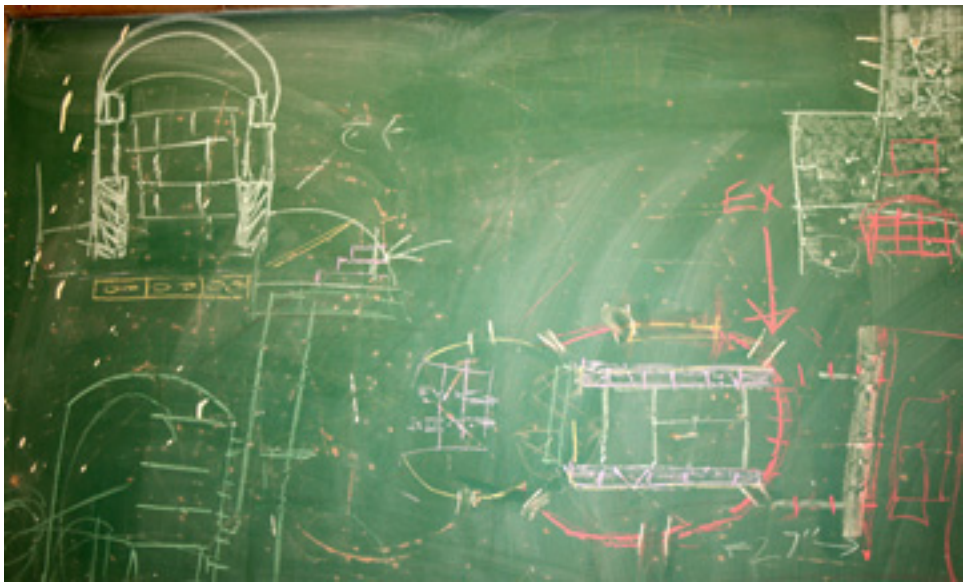


Photo 3 – Form for throat arch

Photo 4 – Castable skew bricks

Photo 5 – Secondary burner ports built into door

Photo 6 – Cat firing with zig-zag lines to burners

Photo 7 – Cat with direct lines from tank

Photo 8 – Melted kiln furniture