

AN INVESTIGATION OF THE USE OF
A TORCH WITH CERAMIC MATERIALS

PROBLEM IN LIEU OF THESIS

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LIST OF SLIDES

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- 2a - Thrown pit-fired vessel with torching and masking tape, 24"H x 14"W x 14"D
- 2b - Detail 2a
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and wax crayon, 20"H x 8-1/2"W x 8-1/2"D
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with torched paint, 10"H x 6"W x 6"D
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- 11b - Detail 11a
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torched paint and tape, 24"H x 10-1/2"W x 11"D
- 12b - Rear view 12a

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- 13a - Thrown form, bisque fired clay (with manganese
dioxide), with torched paint, 25"H x 12"W x 10"D
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manganese dioxide), with paint, chalk and crayon
- 14b - Detail 14a

I. INTRODUCTION

This report documents the changes in my work as a ceramic artist over a two-year period, imposed upon, and inspired by, the use of a propane torch on the surface of the clay vessel. The purpose of this study is two-fold: (1) to provide information about this particular tool for methods of surface decoration; (2) to provide information about a subjective thought process directed by the properties in this particular tool.

This report is based on notes and observations made during the course of the two-year period in which the exploration of the torch was made, and upon the objects produced in that same period.

My undergraduate work was at Louisiana Tech University from which I received a Bachelor of Fine Arts in Painting (Ceramics Minor) in 1976. The first experiences with clay were in courses required for this degree. When I began working on the potter's wheel, I enjoyed the process more than the result. Throwing was not just a means to an end.

For two years after graduation, I was employed as a potter for Marshall Pottery of Marshall, Texas. There I learned the techniques for controlling the spinning ball of clay, able to transform it into any

size or shape I desired, in endless repetition.

I came to North Texas State University's Graduate program to learn more about what is possible to accomplish with the tool called the potter's wheel. I had no illusions about what I would receive in the way of education, because I had no idea what to expect.

The first year-and-a-half was spent in a turmoil of glazes, kilns and forming techniques. I grasped at every bit of information about ceramic techniques and tried them all. I finally settled on a specific starting place for my pots to work from. I began making vessels depicting the female figure relating the bulbous contours to those of a vase or bottle form. The inspiration for these came from my pregnant wife and carved wooden fertility figures from the Ice Age Era.

After approximately six months, the pieces had evolved from stylized figure vessels in stoneware to simple, smooth-textured, curvilinear forms which were pit-fired. Another inspiration was in the smooth contours of the East Texas landscape. The relationships of smooth to rough, geometric to biomorphic, man-made to natural, etc., felt very strong while traveling in East Texas and very relevant to my pots. The pots themselves had smooth surfaces to enhance their curving contours and were unglazed to relate the clay to the

earth.

Pit-firing, in leaves or sawdust, seemed the best method for coloring the surface as all other methods resulted in glaze coating which was not relevant to the natural look and feel of clay. By placing a bisque pot in a closed container of burning sawdust or leaves, a random pattern of carbon markings was obtained which was suitable for my requirements. However, as I worked with the process, I felt limited by the randomness of the smoking. Some area would have too much carbon; some not enough. I needed a way to control this effect.

I found that if an area of a pot was covered by an inert material (such as powdered clay) while pit-firing, that area would remain free of carbon markings. This masking effect led to the use of masking tape applied before pit-firing to mask-off areas from the smoke. This was very successful as I could apply the tape to a form in the manner of a highway crossing the landscape. After pit-firing, the tape could be peeled off to reveal hard-edge linear elements which were light colored against the darkness of the carbon. After pit-firing, all of the tape could not be removed and some of it had burned and melted onto the form. Again, the randomness of the pit-firing was a handicap which caused me to look further for a way to control

it.

Therefore, a tool or technique had to be found which: (1) allowed close control over how much tape could be removed; and (2) a way to add carbon to light colored areas. What was needed was a source of heat which could be applied to a small area, be easily handled and maneuvered, and be cost efficient. A burner from a raku kiln was considered and rejected because of the large uncontrollable flame. An electric soldering iron was inexpensive and easily used, but did not supply enough heat. Although one might be used to make pencil-like marks on some materials.

The household propane torch was selected for its portability, low cost and temperature capability. The question remained: How suitable is the torch for use with ceramic materials and processes?

Approximately 100 pieces were produced which were decorated with the torch, but for the sake of brevity, and repetition, this number was reduced to 14 for this report. These 14 are representative of 4 groupings according to stylistic changes made in the use of the torch in the course of decorating the pieces. These groups are titled as follows: First Group - Pit-Firing with Torching; Second Group - Torching Earth Oxides; Third Group - Torching Non-Traditional Materials;

Fourth Group - Limited Torching.

For each group, four questions were posed.

1. How does torch firing fit into my current direction?
2. What are the limitations of torch firing?
3. What are the possibilities of torch-fired clay surfaces?
4. What materials fire best with a hand-held torch?

It is hoped that by reconstructing the exploration of the tool, and answering the above questions, that an understanding of the subjective process may be attained.

II. DESCRIPTION OF PROCESS

First Group - Pit-Firing with Torching

For controlled removal of masking tape from bisqued ceramic ware, the propane torch was very appropriate. Tape could be applied before or after pit-firing. If applied before, there would be mottled areas of black, brown and pinkish tan across which the tape would run. If the tape ran across an area of black and was burned away, leaving charred remains, the torch could be used to burn the charred residue away completely to leave a gray area through the black.

If the tape was applied to light, uncarbonized areas after pit-firing, it might be ignited with the torch causing carbon marks around it and gray areas in its place. See slides #1a through #3b.

Question #1

Using the hand-held torch at this stage allowed pinpoint control over a previously uncontrollable effect, and destroyed preconceptions about when the finished state of a clay object is reached. In prior experience, after being fired in a kiln, a clay form was termed complete. But by using the torch to modify or enhance the effects made in the firing, the decorative

process is extended.

Question #2

At this stage of removing carbon after pit-firing, and burning tape onto clay surfaces, the color range possibility was limited to black, brown, gray & pink.

It was also noted from the beginning of the project that when heating a relatively small area of a ceramic form, care was required to not overheat the area as thermal shock would occur. The danger of cracking may be reduced by adding grog to the clay body to open it up, and by underfiring it. French provincial cooking ware and most Mexican pottery bowls and casseroles are of this type. They are loose enough in structure to accommodate themselves to the rapid expansion and contraction which result from heating and cooling.

Question #3

Like every student of ceramic techniques, I found that instead of having a sense of accomplishment at discovering a new tool, there was frustration at the realization that there were more possibilities than I could count. The maxim goes: the more you learn, the more you realize you don't know.

The torch effects on the pit-fired pots were very pleasing, but greater range of color values was desired.

I could lighten the surface coloration by heating it, but needed a way to darken the surface as well. Masking tape and other papers, such as toilet paper and paper towels soaked in a glue or binder, added some carbon, but were not easily controlled. Black vinyl tape, also known as electrician's tape, was the answer. When heated by a torch, the tape flamed and smoked the clay surface wherever the torch was pointed. After darkening an area, the tape could be peeled off, exposing a light area. Thus, if needed for balancing a composition, a dark area could be created, defined by a sharp edge against the light.

Texture could be added by draping pieces of acetate (or Clo-pay) on a pot, then heating it to melt and (hopefully) fuse to the surface. Unfortunately, the melted acetate is easily knocked loose after it has cooled.

It occurred to me at this point that since the clay could be heated to cherry red heat (approximately 1380°F) then certain ceramic materials might be applied to the fired clay and fused to it.

Question #4

The best materials were those which burned on the surface and left a mark, or residue. Masking tape was

the most satisfactory as it allowed several different effects by varying the duration and intensity of the heat.

Black vinyl (or electrician's) tape was the next best because it added heavy carbon to the surface when heated. This was very useful on areas which needed darkening.

The next best type of material was an attempt to create a type of "masking" tape for covering large areas of a pot. This involved coating paper toweling or toilet paper with a thinned solution of "Elmer's Glue" and applying same to the pot. When torched, this handmade tape reacted well at times. Most results were negligible with little traces remaining, but sometimes the flashing and smoking from the "tape" left very nice results.

Second Group - Torching Earth Oxides

To add color to the pit-fired monochrome pieces, I began with a material which is readily available and commonly used on ceramics as a colorant: red iron oxide. This material, when applied to fired clay and then torched exhibits little color change from a flat, dull red.

Another form of iron oxide does show a large color change from bright yellow to red and finally to a warm black when torched. This was yellow iron oxide. At this time my work was interrupted by a series of misfortunes-- the most debilitating being the breaking of my right arm which forced drastic changes in the methods of construction used. Not being able to throw forms on the wheel, I turned to handbuilding methods. By making slabs of clay on the floor, and draping them on bowls, I created a base upon which slabs and coils of clay were added to sculpt the forms.

The forms were very different from those made on the wheel but seemed to have a "rightness" about them. The forms are assymetrical and irregular, with cracks and fissures which seemed to be an honest expression of the earth, and the clay itself. The forms range from almost closed bulbous ones, to bowls with irregular rims, reminiscent of David Crane's works. See slides #4a through #7b.

Question #1

The addition of color made the pieces very lively and exciting as I was not restricted to a limited palette of tan, white and black. Also, as the forms had become rougher and more irregular, suggesting

landscape imagery, I could increase the suggestion by employing the colors of same.

Question #2

As the temperature reached with a torch is in the range of only 900°-1300°F, which is considerably lower than the fusing point of most (but not all) ceramic oxides, care must be taken in handling works with oxides on them as they might smear or be rubbed off completely. (A spray-on varnish used for fixing drawing media to paper was applied in those cases where a fragile surface required protection.) Also, the draped slab forms were not as structurally sound as those made on the wheel and cracked when heated with the torch.

Question #3

The ability to add color to fired ceramics completely changes the concept of decorating them. No longer is a ceramist limited to the traditional methods of decorating a piece before firing, not knowing completely what the finished product will look like afterward, and if dissatisfied there is nothing that may be done to remove coloration. When using a torch, a clay piece may be approached as a painter does a canvas. Color may be applied by brushing, dripping or spraying, and

torched to the desired hue. This may be repeated as often as desired to create varied hues and richly colored areas. If desired, oxides may be lightened or removed entirely by rubbing with sandpaper or sandblasting lightly. These methods may be used in combination with those earlier described.

Question #4

As noted earlier, ceramic oxides of metals have higher melting points than can be reached with a torch and some do not exhibit any color change unless heated to that melting point. However, certain ones do exhibit color changes at lower temperatures and work very well with a torch. These are: Yellow Iron Oxide--bright yellow to bright red to black; Copper Carbonate--dull green to black (except when adjacent to carbon areas which causes local reduction changing to deep crimson).

Third Group - Torching Non-Traditional Materials

By the end of 1981, I had recovered the use of my arm and resumed working on the wheel. The reason being that on the handbuilt pieces, the varied colors competed with the rough texture of the slabbed surface for dominance. Instead of harmony, there was discordance. The forms I made on the wheel may be characterized by

the smoothness of both contour and surface texture. This smooth quality served as a more favorable canvas for coloring than the rough-textured slab-constructed forms made previously. See slides #8a through #12b.

Question #1

Torch firing of colors onto clay was the most appropriate use by this stage. By this time, I was not using ceramic oxides for color as the few colors available were not satisfactory or were too expensive to justify experimentation. Instead, I began using enamel paint from a spray can, tempera paints, acrylic paint, etc.; and for textures, I used duct tape, masking tape of various widths, electrician's tape, and slip (liquid clay) mixed with paint. The forms had smooth yet undulating profiles which harkened back to the figure-inspired forms made early on. Forms were manipulated much more than in the previous stages. Rims were torn or moved to break the surface tension in earlier pieces. Holes were poked through the walls and left open. The vessel was intact but was losing all connection with utilitarian uses. The coloration was still inspired by the landscape or the geographic area, however. The use of the paints and other materials allowed great flexibility, and restraint was called for many times. The use of

restraint in coloring the surface of the form resulted in the most successful pieces of the series.

Question #2

The only limitation encountered at this stage was the time required to affect a color change in a paint or other material over a large area. I began leaving large areas of uncolored clay or not torching the paint after application.

Question #3

By using a torch and paint on a clay surface, colors and textural effects are achieved which are impossible by any other means. This is valuable to the ceramist and also to those untrained in the use of traditional ceramic colorants. For the ceramist, the torch extends the firing range to a much lower point than is commonly used. This means that a clay object may begin with a glaze fired to Cone 10 (2360°F), onto which a low-temperature enamel is fired (1500°F). Then, paint may be applied, which, when fired on with a torch may add further depth, color, texture and richness to the clay piece.

For the artist who wishes to decorate clay forms without the background in chemistry and kilns, torching paint allows a freedom of expression with immediate

control over the final colors desired.

Question #4

Many materials were used which worked well.

Acrylic paint alone was satisfactory, as were temperas and watercolors, but acrylic paint mixed with slip, applied to the fired surface and then torched gave a unique surface texture. A dark clay body was formulated which worked well with the coloring materials (see appendix). This gave a warmth to the finished pieces and in fact made them appear more "finished." Of the pieces made of the light-colored clay body, many appeared to be very stark and required much smoking in order to make the bright colors work with the clay. In other words, the colors applied to the light clay seemed applied instead of being of the clay. The dark clay helped in this regard immensely and required no additional smoked areas.

An additional method of applying color was used on this group which was suggested by another graduate student. By placing upholstery fabric with silkscreened patterns on the forms and then igniting with the torch, some of the pigments from the fabric transfer onto the clay surface. (Slides #11a and #11b.)

Fourth Group - Limited Torching

This was the final group of pieces made at NTSU and represents the culmination of an evolution of ideas, techniques and perhaps most important of all personal viewpoint, acquired and developed over a four-year period. See slides #13 and 14.

Question #1

The greatest change of technique for this group from the previous is in the amount of torching applied to the pieces. Whereas in the previous groups all paint had been torched to fade the colors in the clay, on Group 4 very little actual torching of the paint took place. This occurred because of two reasons: (1) a growing dissatisfaction with the necessity to apply the paint only to remove it with the torch, and (2) a changing conception of the pieces. This concept finally was saying, "Hey, what's the matter with just painting the clay?" Eureka! I didn't need to have a token firing of the paint to call it ceramics. This revelation was aided by the coinciding workshop held by Peter Voulkos on campus. The freedom with which he approached the material was the catalyst I needed to take that step I had been building toward since perhaps my very first attempt to apply a decoration to pottery 8 years

earlier.

Question #2

The limitations at this stage, beyond those mentioned above, were in using the torch on paint applied over a fired glaze. The torch burned away, the vehicle in the paint and left only the pigment which could not adhere because of the slickness of the glaze and the fragility of the torched paint residue.

Question #3

More exploration of the techniques outlined here is needed as many materials and processes are available which might be used in combination with the torch on clay. Some of these possibilities which I was unable to attempt are: different torch types (oxy-acetylene, arc-welding, solder, etc.); extremely low-fire clay bodies (mixtures with high-percentages of grog, flux, and non-ceramic materials such as nylon and silicon materials); low-temperature ceramic materials (china-paints, lusters, decals--this category is ripe for experimentation with the torch as many are well within the temperatures reached by the torch, and for the large number, available commercially).

Question #4

At this point in my study of the torch and its use on clay pieces, the best materials were those requiring the least torching, but which could be applied in such a manner that the clay texture and form were not sublimated. Those materials include acrylic paints, oil pastels, crayons, and spray enamel paints.

III. SUMMARY

Upon entering NTSU's Graduate Program in Ceramics, I was bombarded with information about techniques, processes and equipment used in the manufacture of pottery. Coming in with a background in painting, and an apprenticeship at a folk pottery, I was immersed in the typical production pottery frame of mind established by Bernard Leach in the 1940's. But after a year's time in the Graduate program my concepts about clay began to change. There were 12 Graduate Students in the program, each with a different approach to the same material. Those 11 other approaches were proof to me that my way was not necessarily the best.

These concept changes took form in experimentation with different firing techniques, running down the temperature scale thru stoneware, salt glazing, low-temperature salt glazing, raku, pit-firing, finally to the torch.

The adaptation and use of the torch for applying surface enrichment to fired clay came about after a fellow graduate student's suggestion to use a torch for controlled removal of coloration after pit-firing.

This discussion was the catalyst for the experimentation in the use of the torch. At first the torch was used for spot removal of carbon after pit-firing, then used

for adding carbon to other areas by igniting flammable materials such as vinyl electrician's tape. After a period of months, a need for color was perceived, and there began a search for usable materials which when torched yielded colors in harmony with the clay, yet were stable, that is, relatively permanent. Many materials were tried beginning with ceramic-oxides, which yielded interesting yet unstable results. Then a variety of paints and drawing media were tried, all of which were affected by the torch in varying degrees of success. At the same time various materials for masking off areas of the surface for torching were tried, with mixed results: masking tape of various width, vinyl electrician's tape, and plastics of various types.

The torch is a tool for applying a controlled amount of heat to a small area on the surface of a clay vessel for visual enhancement. The control gained allows the user greater control over subject matter. Thus I could relate the coloration of the vessel's surface to the landscape and figurative imagery on which the clay forms themselves were based.

The main point to be made by the search for the proper materials to use with the torch is that materials were all usable but the torch was the limiting element. As I found out soon after entering NTSU, the potter's

wheel was not an end in itself but was in fact a tool with limited capabilities for taking advantage of the full scope of the clay material. Not until I exhausted my resources in the search for materials to use with the torch did I realize that the same criteria applied to the torch as it did to the potter's wheel. That is, in skilled hands a tool has specific capabilities, it should not be perceived as a motive for creation in itself.

APPENDIX

Low-Temperature Clay Body #1:

A.P. Geen Fireclay	100
Ball Clay	35
Feldspar	20
Talc	20
Grog	20

Low-Temperature Clay Body #2:

A.P. Green Fireclay	100
Ball Clay	35
Feldspar	20
Talc	20
Grog	20
Manganese Dioxide	10
Yellow Iron Oxide	5























































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