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SURFACE ENHANCEMENT OF HANDBUILT FORMS

by

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College of Fine and Applied Arts of the
Rochester Institute of Technology

Submitted on May 15, 1972

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For the wonders
of our eons-old earth
and its impossible
possibilities for life
my work is done in thanks.

Introduction

This thesis report is meant to be, as Professor Cowles suggested, a record of the type of work I've done, so that ideas or formulas I may have developed will be available for others to use and hopefully carry further.

I, as most of those who will read this paper, love clay--the feel of it, the look of it, the smell of it, in all its different states; slurry, soft, leather hard, dry, for all its innumerable possibilities; slabs, coils, impression possibilities...

For me, the closest contact I can have with clay and the best way I can realize its potential is through handbuilding. It is a very intimate way of working. By the time I've finished a piece, I have pondered over every inch of a pot's surface. I've had to decide which coils, paddle marks, slab edges etc.... to keep, which to change, which to reduce, which to improve. The final green surface is a very important part of the pot, not to be hidden under glaze. Because of this, and because when I have finished a pot and am ready to let it dry it is in my mind actually "finished", the next traditional process for a pot, the glazing of it, presented a great problem. The attempt to solve this problem, to find ways of having the final firing crystallize the idea of each individual piece, is the basis of this thesis.

WHY GLAZE AT ALL?

This is a good question, especially as regards hand-built pots. It is relatively easy for me to glaze functional, wheel-thrown work, because I am not so involved with the surface of the piece and can cover it up with glaze more easily. Also, in the interest of comfort and sanitation, it is pleasing to have the pot glazed. However, as I found and developed slips and glazes and methods of application for wheel ware I became aware of the aesthetic properties of glaze--the speckling through of iron from the body, marks left by the brush stroke, and of course the possibilities of color; colors reflected from deep in a glaze, flat surface color, color seen through an opaque glaze versus the same colors seen through a transparent one, colors contrasting and interacting with each other. And as I began to "love" these certain things about glazes I wanted to put them not only on the inside of my pots, where they would be functionally pleasing, but on the outside where they would be aesthetically pleasing.

One of the first things I wanted from a cone 9 glaze was a dependable way of getting the colors pink and red. Pink is simply gotten in a reduction atmosphere by adding 2% copper carbonate to a white slip and covering that with a glaze which will protect the copper from being reoxidized as the kiln cools and so keep a copper red color instead of a copper blue or green. I used two white slips with equal success, with the one

from Bob Schmitz having a possible advantage in that it does not settle as rapidly as SAC CH₃.

SAC CH3 White Slip with Copper

Flint	55
Bainbridge Feldspar	10
Frit 3110	15
Ky. "Special" Ball Clay	15
Opax	5
Bentonite	6.5
Copper Carbonate	2%

White Slip with Copper (from Bob Schmitz)

Buckingham Feldspar	35.1
EPK	9.9
Whiting	13.5
Flint	16.2
Zinc Oxide	1.8
Zircopax	20.0
Copper Carbonate	2 %

Over these slips I used a white glaze called Waxy White (from Bob Jarvis) in which I increased the flint slightly to bring out the pink from the slip a bit more. The white glaze must be applied heavily enough though, or no pink will result.

Waxy White (re#2) Cone 9

Clinchfield Feldspar	123
Gerstley Borate	36
Dolomite	21
Talc	45
Kaolin	15
Flint	70
Tin Oxide	1.5

During this year a shipment of Clinchfield was received which was much more refractory than the previous Clinchfield, and so I used

Clinchfield	83
Nepheline Syenite	40

instead of 123 Clinchfield, and that worked. Later on I substituted Cornwall Stone Feldspar for Clinchfield in the original formula, and that also worked.

For a deep ruby maroon I sprayed

Strontium-Bainbridge	Cone 9
Strontium Carbonate	20
Bainbridge Feldspar	40

over the white glaze (which is over the slip). This breaks

the white to a glossy transparent which shows the copper below as a deep red-maroon. The mirror plaque in Plate 22 shows this effect.

This Stontium glaze has been valuable to me as it seems to intensify pretty much any color it is over. However, Bainbridge F-4 Feldspar recently became unavailable and the substitution, Kona F-4, does not behave quite the same. I have not yet, though, determined just how great the change will affect the uses described above.

I also wanted a copper red glaze, and so with Professor Cowles this rather formidable formule was devised.

Mix Red Cone 9	
Nepheline Syenite	100
Cornwall Stone	180
Spodumene	180
Dolomite	180
Kaolin	180
Flint	200
Barium Carbonate	200
Frit 3124	60
Zinc Oxide	20
Tin Oxide	16
Copper Carbonate	4



Plate 1. Bowl, 8"d.; Slips brushed on, glazes poured and brushed over.



Plate 2. Red, Roofed Pot, 12" X 12" X 8";
Glazes brushed.

This glaze must be applied heavily (as the upper part of the glaze will reoxidize in cooling) and, as it is runny, is quite effective when on a horizontal surface where it can pool. I have often used Waxy White over it to protect and intensify the red. The atmosphere of the kiln is important, as always, in getting copper reds. I used Waxy White over a pink and an iron slip on the inside of the bowl in Plate 1, and Mix Red with a protective coating of Waxy White over it on the outside with pleasing results. So I decided to use these glazes to accent one of my handbuilt pots.

I brushed the white on the roof of Red, Roofed Pot (Plate 2) rather thinly to preserve the beautiful texture, but it didn't work. The brush caught on the textures and delivered glaze into the crevices instead of skipping over them. On the coils I used Mix Red with a coating of Waxy White, and though the red did come on one side of the pot, the thickness and running of the coating turned the strong, vivacious, coiled sides into a wishy-washy, lumped-up surface. All the care that had gone into the look of the clay, all texture impressions, the coils, the hard edge slabs, were neutralized and smothered forever beneath coatings of glaze. This is the antithesis of what glazing should be for my handbuilt forms.

WHAT SHOULD GLAZING BE?

It doesn't sound revolutionary, but I've only slowly been able to realize that glazing must somehow accent the form meaning of each individual piece. It must not overpower, contradict, or hide the idea of the pot, but must just, sensitively, be able to push the shape one little bit further, into, say, color, and so forever crystallize the "essence" of the piece.

Now this is not an easy thing to do, and is made even more difficult by the time interval between the finishing of the raw piece and the glazing of the bisqued piece. To understand the piece you have to understand, among other things, its construction. So some of the discussion to follow will be concerned with methods of construction and the feeling they contribute to the whole piece.

SEGMENTED SECTIONS

At one point I felt I needed segmented tubular sections, reminiscent of insect legs. I found a good effect was possible by packing clay around, say, a broom handle (with newspaper rolled onto it first to prevent the clay sticking), and then rolling with even pressure on each end of the handle. This rolling thins the clay into a cylinder around



Plate 3. Covered Segmented Pot, 19" X 4";
Glaze sprayed, and Gourd Pot, 9" X 6";
Slips and glazes brushed.

the handle, which is then stood up on end. With the handle still controlling the cylinder from the inside, a sharp edge is used to press horizontal lines into the cylinder from the outside. The handle from the inside is used to tap outward to form bulges, and by this alternate pushing outward and incising inward segments such as those in the pot on the left in Plate 3 are formed.

In order to make this type of segmentation the clay must be rather soft and plastic, but still hard enough to stand by itself. The gentle flowing curves and undulations in the pot and the imprinted texture of the canvas resulting from the pot being made while rather soft, and its being largely visibly untouched after the rolling were important aspects of the pot. A bright glaze would have reflected light and disturbed the subtle reflection of the pot's own curves and a thickly applied glaze would have covered the texture. Perhaps it could have been left unglazed, but to make it just a little more finished looking (and to experiment with glazing) I sprayed it with the Strontium-Bainbridge glaze. Spraying the glaze allowed a thin enough application, and also accents undulations and even textures in the clay because it hits chiefly raised areas and skips over lower areas. It does not fill in cracks and depressions as pouring or brushing would.

I used this method of making segments on some more pots, and then wanted to make some smaller ones that could be solid. I eventually found a way to get very soft smooth organic-

looking sausage shapes: I rolled out a coil of clay, $\frac{1}{2}$ " to 1" diameter, on a smooth surface, then rolled a piece of very thin rubber called Dental Dam around it, and then by tying a string around the coil and rubber and pulling it tight, a segment like a sausage was formed.

This same method was used on larger sections--about 2" in diameter--which were made by the previous technique and hollow. The biggest problem with segmented shapes comes when you try to use them; they are very weak little things and not very plastic, so that when you try to bend them into a shape they crack apart. They are also very delicate when dry, and tend to shrink away from their set position, become unbalanced, fall and break themselves or others. I would like to develop some slip or something that could be poured over a whole arrangement while damp to weld the whole more **solidly** together.

The segments in Plate 4 were made with a combination of these methods.

CONTRAST

Contrast, I have always felt, plays a very important part in my work. The record of a piece's construction always shows to a rather great degree, and so nearly every three dimensional object is a design incorporating coils, slabs, press molded shapes and often paddle marks, incised lines, stretch cracks, accidental textures and the like. I am conscious of

the contrasts set up by these elements as I work, and they to some degree determine the final shape of the piece. (For instance, if a very interesting texture happens to occur on a part of a piece that should be pounded away, I may change the whole rest of the pot rather than destroy that good texture area.)

In the piece on Plate 4 a contrast was set up at the time of construction between the organic sausage shapes, made with soft thin clay, and the harder, thicker shell-like form supporting them.

In the glazing process, the segments were left unglazed, having only a little white and black and gray slip brushed lightly on for variation, so as to look more immediate and alive compared to the lower part. It had blue and black slip dabbed into texture areas for interest, and had black slip brushed on the vertical part so as not to overpower the segments. Then the whole lower part from the platform down was sprayed with the Strontium-Bainbridge glaze. It accented the press mold bowl shape and made the whole part look colder, more shell-like and less alive than the upper segments.

In these two pieces, Blue Lidded Pot and the Magazine Rack (Plate 5,6, and 7) well defined contrast was used in each construction process. In the Blue Lidded Pot the base was made inside a bisqued bowl, then coils were laid and paddled into shape. Slab pieces were used for the handles at the side,



Plate 4. Pot with Segments, 15" height;
Slips brushed, glaze sprayed.



Plate 5. Blue Lidded Pot, 20" X 18" X 10";
Glazes brushed over slips.



Plates 6 and 7. Magazine Rack, 17" X 22" X 7";
Slips, washes, and glazes brushed on,
glazes brushed over.

and a large slab was rolled for the lid. To accent the coils Albany Slip was dribbled into the creases and allowed to run as the pot was held on its side. It and pink slip was also used to define and create colored areas on the handles.

Then Rich Matt, a blue glaze of Val Cushing's that allows the iron in Albany to burn through, was brushed over.

Val Cushing's Rich Matt	Cone 9
Buckingham Feldspar	36
Dolomite	18
Gerstley Borate	4
Whiting	4
EPK	22
Flint	16
Cobalt Carbonate	1 %
Chromium Oxide	$\frac{1}{4}$ %
Granular Manganese	$\frac{1}{4}$ %

The top being very different in construction and very simple was glazed a simple contrasting white.

The second object, the Magazine Rack, is a similar piece, but takes more advantage of the possibilities slabs present. As I was rolling out a large slab of clay to cut up for another piece, I noticed what a finely shaped and beautifully textured slab it was all by itself, and thought how good it would look as one side of a big two sided slab pot. So I traced

its outline on canvas and made another approximately the same shape and textured it. After letting them harden a little, I laid a coil wall about seven inches high along what was to be the two sides and bottom. When that was hard enough, I joined the second slab to the last coil on the wall, and later set the piece right side up and paddled it into shape. (Unfortunately, the coil sides were made a bit thicker than necessary, thus they dried more slowly than the slab front and back, and a big crack developed right across the middle of the pot's bottom and half way up each of the slabs. This was corrected with the aid of Fiberglas and will be discussed more fully in the section on Fiberglas.)

When the pot was ready to be glazed I had two pleasing slabs upon which to paint. I accented the already existing textures by running an iron wash of equal volumes of red iron oxide and Gerstley Borate into them. I also added some texture areas, red and blue glazes, and covered part of each side with Grey Transparent (from Bob Jarvis), a glaze that allows the brush strokes to show with Waxy White, which looks similar but does not show the brush marks.

Grey Transparent	Cone 9
Dolomite	55.8
Nepheline Syenite	135.0
Whiting	30.0
Kaolin	82.2

Flint	46.0
Opax	11.0
Zinc Oxide	8.0

The two slab sides were treated as paintings, and were set aside from the rest of the pot, or framed, by the coil sides which were glazed a contrasting blue. (Again Val Cushing's Rich Matt over iron wash in coil creases.)

Another pot which was glazed successfully, i.e. in the spirit of the piece, was the sphinx-like Lion (Plate 8,9, and 10). The whole piece is made from very thin slabs, as can be seen through the sprayed glaze at the bottom of the piece where the ends overlap. The two sides are contrasted with the armor-like center plate by being brushed lightly with a wide brush with blue slip. The edge of the armor had a rutile slip dripped in the incised lines.

Slip (from Bob Schmitz)

Albany Slip	65
Nepheline Syenite	10
Barium Carbonate	10
Talc	15
plus 10 % Rutile = Rutile Slip	
plus 3 % Cobalt Oxide = Blue Slip	

The headpiece had iron wash accenting the thin edge, and dribbled



Plates 8, 9, and 10. Lion, 19" X 13" X 18";
Slips brushed, glazes brushed and sprayed.



Plates 11 and 12. Winged Pot, 19" X 24" X 21";
Slips and glazes brushed.

into cut lines. The face had some rutile slip brushed on, then was sprayed with Strontium-Bainbridge to form the subtle mat with tan and rutile blue breakings. The sleeping face is the quietest and most elusive part of the piece. It is brought into sharp contrast with the armor-like triangular piece which is glazed white. Here it can be seen how Waxy White is broken to a transparent bright glaze by Strontium-Bainbridge, which was sprayed over the blue sides and part way into the white triangle. On the back of the pot, the smaller slabs are set apart from the bigger ones by slip and variations in types of lines.

The whole piece, though glazed with highly contrasting colors, was covered quite thinly with slips and glazes, and allows nearly all the original clay quality to show through. What little may have been lost is made up for by the interesting details created by the glazes themselves (see Plate 9).

Plate 11 and 12 of Winged Pot show a large involved piece. It took about two weeks to build, and was a combination of press molded pieces, coils, slabs, pinching technique and various surface textures. I was reasonably satisfied with the final shape, especially the idea of the wings, and very much liked the surface of the whole thing. It seemed a lyrical, poetic piece. At the time of the glazing, unfortunately I think, the "poetical feeling" was a little too overwhelming, and a thick riot of pink and blues and greens were deposited on the surface.

The darker blue was the blue slip, the red and pinks the pink slip covered by white glaze and/or Strontium-Bainbridge. The blue-green was a wash of copper sulfate applied near the end and covered by only a thin layer of glaze which did not prevent its reoxidation. The iron wash was also run into cracks. After all the various under colors were applied Waxy White was applied by brush mainly on the upper half. Strontium-Bainbridge was again added on top to break the white in places, but at this time Kona Feldspar was sent in place of Bainbridge and I think it caused less of a bright transparent effect over the Waxy White than the Bainbridge would have. Grey Transparent was brushed on mainly the lower half of the piece.

The glazing process here changed the piece very much, in texture and color emphasis, and so would not fit my definition of a successful job. But the results are much more pleasing than in the first example of bad glazing, the Red, Roofed Pot, and with the passage of time I have come to like the whimsically colored, big, pink bird standing ready to float off into the horizon. I'll probably never do a piece like it again.

These last pieces were made after Don Rietz came and demonstrated here at R.I.T. I was very impressed with his control of the clay, and how every act performed on the clay should be "right" and should be visible in the final product. This is most evident perhaps in Winged Victory where the

tapering coils in the wings were rolled to the proper increasing lengths to form their outward thrust. It is immediately visibly apparent how and why the wings look like they do.

So with this heightened awareness of the clay being the record of the building of the piece and its being a large part of its "essence" came a redoubled effort at glazing.

In the making of the Bowl (Plates 13 and 14) the rhythm set up by pinching the coils together on the inside was interrupted, perhaps by a crack that had to be repaired, and as Professor Cowles pointed out, was rather displeasing as the bowl was wide open and called attention to its inside. So in an effort to somewhat hide the flaw I brushed the iron wash on the high parts of the inside (it burns black through the blue-green glaze), and then slosed Opaque Blue-Green over the whole inside. The glaze is described in the next section on Platters and Mirror Plaques. To contrast, the outside was lightly sprayed with Misty Blue Celadon, after having iron run into cracks and rutile wash ($\frac{1}{2}$ rutile and $\frac{1}{2}$ Gerstley Borate by volume) brushed on the press mold section and part of the coils. The glaze was too thin to have any color effect, though it provided a pleasing transparent coating that allows the coils to show clearly, and so I accented certain areas with Grey Transparent and fired it to cone 9 for a second time. This time the glaze heightened the rutile into a rather bright yellow, and provided just enough strength in color on the outside to complement the inside. (The inside,



Plates 13 and 14. Bowl, 17" X 14" X 10";
Slips brushed, glazes poured, brushed and
sprayed.



Plate 15. Covered Box, 14" height, Slips and glazes brushed, white glaze sprayed.



Plate 16. Scened Box, 15" X 8" X 8"; Slips and glazes brushed, white glaze sprayed.

incidentally, only ran a bit more and got a little greener due to the second firing. There were no bad effects on the clay-Fiberglas body either.)

On the two covered boxes in Plates 15 and 16 the glazing methods are obvious. The flat sides are treated as painting surfaces, and are heavily covered with glazes and colors. These glossy, thickly glazed surfaces are contrasted in color and texture as well as in construction by having a white glaze (Waxy White) very lightly sprayed so that it is dry and mat. This accents the thinness and delicate undulations of the top and sides.

In Winged Victory (Plates 17 and 18) the glazing is most minimally done. The coils were covered with tape and the three bowl shapes and the slab sprayed with the Opaque Blue-Green glaze. It was not a very heavy application and thus the color is more green than blue. The contrast of those areas is increased by the surrounding coils being left completely unglazed. The lid and the base were sprayed with Grey Transparent, and where it is thick enough it goes to its cream white color. Where thin it turns the clay darker brown due to the clay's iron, and this contrasts just subtly enough, I hope, to also accent the bare coils.

Again, the glazing here is very minimal and allows the clay to speak mostly for itself; for that reason it may be the most successful method.



Plates 17 and 18. Winged Victory, 16" X 13" X 11";
Glaze sprayed.



Plate 19. Man Platter, 19" length.



Plate 20. Platter, 12" length.

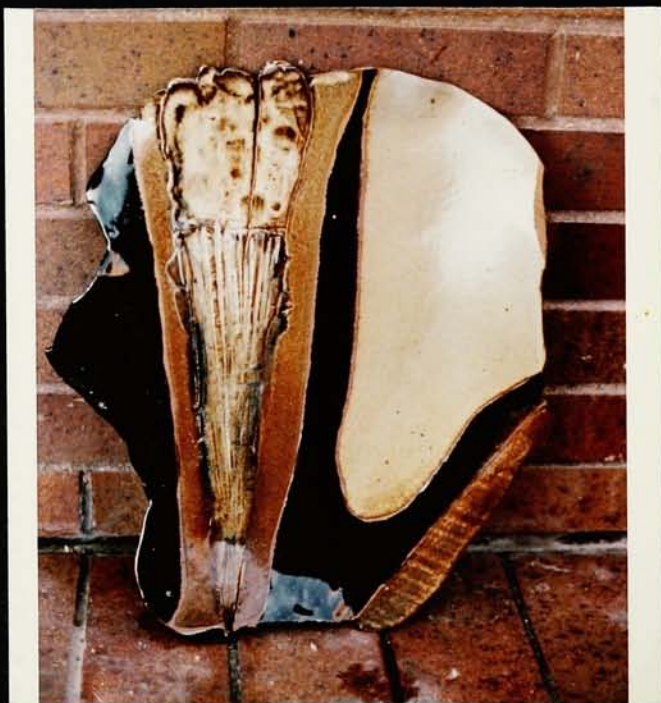


Plate 21. Platter, 16" length.

PLATTERS AND MIRROR PLAQUES

I first began to make what I refer to as two dimensional pieces (which is actually untrue) when I found, as nearly everyone does, how pleasing some of the slabs-that you are rolling out for some other purpose-are all by themselves. Some, such as the Man Platter (Plate 19) are already complete and need only a few defining lines and colors. Others come from combining a few scrap shapes and joining them with coils or other textured pieces (Plates 20 and 21). Others are more deliberately done, such as Plate 22 and all square platters. They are rolled and cut to a predetermined shape and size. Bob Schmitz opened a new field when he suggested that I cut out certain areas to mount mirrors behind and use as mirror plaques on the wall (Plates 22, 23, 24).

Platters and plaques have been very valuable to me as they allow an outlet for my two dimensional instincts and printmaking background. They afford a surface that needs only to be considered mainly in a two dimensional way; they afford complete freedom for line, shape, color experimentation; and they afford a flat surface upon which to demonstrate characteristics of some glazes that cannot be seen when fired in a vertical position.

These two dimensional things are much more quickly produced than three dimensional pieces, and thus I have done glaze tests on them rather than on three dimensional pieces.

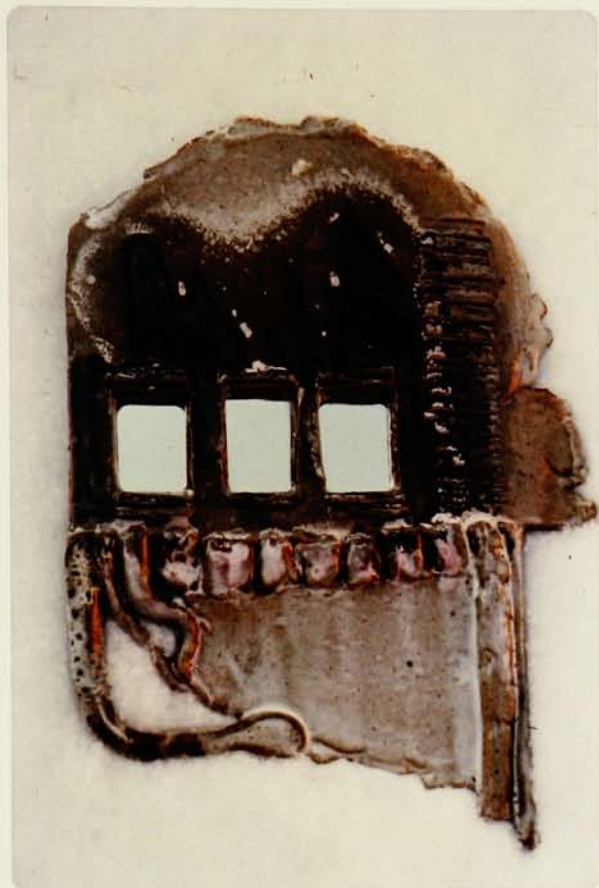


Plate 22. Mirror Plaque, 16" X 11".



Plate 23. Mirror Plaque, 15" X 17".



Plate 24. Mirror Plaque, 11" X 10".



Plate 25. Platter, 12" square.



Plate 26. Platter, 12" square.

This is where I discovered that glazes have different effects when fired horizontally where they can slowly run, crystallize, pool, etc..Plates 20, 25, and 26 show a blue glaze modified from one found in Pat Swyler's thesis that she used in oxidation.

Pat Swyler's Blue (Modified) Cone 9

Nepheline Syenite	130
Barium Carbonate	70
Kaolin	10
Flint	22
Copper Carbonate	8
Lithium Carbonate	4
Tin Oxide	5 %

This glaze at cone 9 in reduction is an interesting somewhat textured looking blue-black, which has some very handsome lighter electric blue crystals brightening it up. These blue crystals seem to be composed of baria , alumina, and silica. The glaze should be applied rather heavily to get more of this blue.

Plate 25 and 26 also shows what the wash of half rutile/ half Gerstley Borate by volume does when applied over the blue glaze. A light layer of it results in a bright yellow color, and when the glazes pool at the bottom of a platter there is a mottling of intense blue, blue-green, and yellow. (Plate 25) Interestingly, the rutile under the glaze does not work at all; neither does the iron wash over or under the glaze. They all

cause furious blistering.

If a CH3 white slip with double the usual amount of flint is applied over the glaze, it will not re-oxidize to blue but will remain a rich maroon red. Waxy White over will produce the same effect, and Transparent Grey will cause a more opaque red, or pink. (This glaze was used to get the reds and pinks in Plates 6 and 7).

Plate 27 shows another blue glaze developed to burn orange where thinly applied and turquoise blue where heavier. It doesn't really go orange where thin on my clay body because it is quite dark with a heavy reduction, but it does turn a dark brown-orange. On an orange clay body that effect would be easily gotten I think. At any rate, this glaze has very interesting variations as it is, going from a matt opaque turquoise blue where thick to a more bright transparent green where thinner, to an orange-brown where rubbed off. It also causes the iron wash to burn through in a very pleasing black color that contrasts very well with the blue of the glaze.

Opaque Blue-Green	Cone 9
Bainbridge Feldspar	20
Whiting	7
Flint	10
Chromium Oxide	.37
Cobalt Carbonate	.18

This glaze was developed using the old Bainbridge but I didn't notice any serious difference resulting from later substitution of Kona. Plate 13 shows this glaze using Kona thickly applied; Plates 17 and 18 shows the same thinly applied.

The plaque in Plate 27 shows how my printmaking experience is sometimes utilized. Here an oddly shaped etching plate was pressed into half the slab, then turned over and pressed into the other half. (See the blue area). Perhaps much of my concern for surface belies this printmaking background.

In Plate 28 is an iron glaze that shows much more interesting characteristics when fired on a horizontal rather than vertical plane.

This is the glaze as it was first developed;

Strontium Carbonate	20
Bainbridge Feldspar	40
Flint	20
Bone Ash	8 %
Red Iron Oxide	15 %

It formed very many large metallic red iron crystals (color of copper metal). But when Kona F-4 Feldspar was substituted for Bainbridge, the crystals didn't form at all. After many trials, a glaze was developed which didn't use the feldspar at all, but which seemed to duplicate the original effects quite well.

Iron Crystal Glaze	Cone 9
Strontium Carbonate	20
Nepheline Syenite	30
Flint	30
Bone Ash	8 %
Red Iron Oxide	15 %

This glaze must be applied thickly to get good crystal formation.

In Plate 28 the iron content was raised to 18 % to get more iron crystals. The black area in the center of the platter was made by alternating about three applications of the iron wash with the glaze. This builds up an overload of iron which causes the black color. Also seen upon close inspection of this area is what looks like pieces of transparent yellow crystals or yellow glass. It is probably a different glass (Boron based glass) introduced by the Gerstley Borate.

The glossy green line (which here looks black) at the edge of the iron circle is another iron glaze, using less iron, of course.

Glossy Green Semi-Transparent	Cone 9
old Clinchfield Feldspar	85
or	
new Clinchfield Feldspar	58
Nepheline Syenite	27



Plate 27. Wall Plaque. 21" X 13".

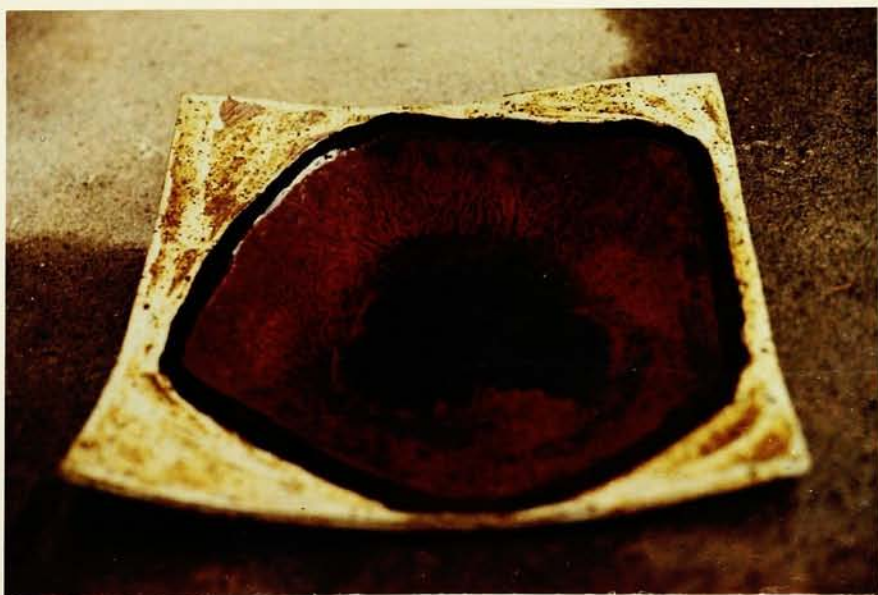


Plate 28. Platter, 12" square.



Plate 29. Platter, 12" square.

Whiting	15
Flint	10
Lithium Carbonate	2
Bone Ash	5
Red Iron Oxide	3.5

The lighter background in Plate 28 is Grey Transparent, applied with a stiff brush so that the strokes would burn through. The speckling is from the iron in the clay body.

Another glaze was developed from the Iron Crystal Glaze (Plate 29). It was the result of wondering what the glaze would be like without bone Ash, and brushing the usual rutile and iron wash over.

Iron-No Bone Ash	Cone 9
Strontium Carbonate	20
Nepheline Syenite	30
Flint	25
Red Iron Oxide	15 %

The rutile wash causes very fine yellow and gold crystals, and the iron, a glossy black. The glaze itself is matt and has variations of iron maroon, grey maroon, and green. The white is Waxy White.

WOOD FIRED POTS

Two pots, Plate 30 and 31, were glazed in a wood kiln. The first, Snails Mating, was partly made with colored clay, i.e. clay that had a percentage of oxides wedged into it. The whole piece was sprayed with a glaze and fired to cone 9, but it was not successful. I decided to put it and Roofed Pot which was unglazed into the wood kiln when offered the chance. Wherever these pieces overhung or were hit directly by the flame an ash glaze, yellowish opaque where thin, green transparent where thick, was deposited. From admittedly only superficial contact with wood firing, I think that this way of glazing is not very likely to ruin a piece, but don't think it would offer me anything not possible in a gas firing. For more on wood firing see Bob Woo's thesis.

EXPERIMENTS WITH PLASTIC

After I made the Pot with Segments (Plate 4) and perfected the method of making sausage shapes, I became engrossed in doing a number of pieces of a type I had never done before. They were different for a number of reasons. First, I wanted to use various forms of plastic in combination with clay to set up contrasts between the two materials. All the other pieces were expressed only in clay. Secondly, these images were pre-conceived (to plan for the plastic inclusions later) and were



Plate 30. Snails Mating, 10" X 11" X 7";
Oxides in clay, glaze, wood fired.



Plate 31. Roofed Pot, 19" X 13" X 9";
Wood fired.



Plates 32 and 33. Extrusions, 10" height;
Bisque ware, plastic, wire, acrylics.

important for the ideas they called forth, not for their actual working out in clay and glaze. Thirdly, these are not functional pots. They are images-for me, strange, subconscious things. I don't think they are repulsive or ugly; neither were they meant to be sensational or attention getting. They do elicit a rather strong emotional reaction from me and I'm not sure why. (I think they are related somehow to the experience of natural childbirth six months previous, but that is a whole other marvelous story.)

Some of these pieces utilize the sausage shapes (Plates 32, 33, 34, 35), and some (Plates 36 and 37) a more mechanical tubular segmentation first done in the shape on the right of Plate 3, Gourd Pot. Extrusions, a bisque ware piece, (Plate 32 and 33) is a very obvious statement of something organic looking being extruded from a menacing mechanical shape. The shape looks even more mysterious being partly wrapped in a plastic bag (as so much is today), and more sinister as wire is used to wrap it around. The bag and the extruder are sprayed with black enamel, and the rest of the piece is painted with acrylics. The reason acrylics were used instead of glaze is mostly just expediency. I wanted a quick way to get a certain effect with colors I hadn't developed in glaze, and acrylics allowed more freedom to change and adjust the colors. Also, I wanted the bag to be the same black as the piece, and a black glaze wouldn't have been as similar. Although all of the other pieces are

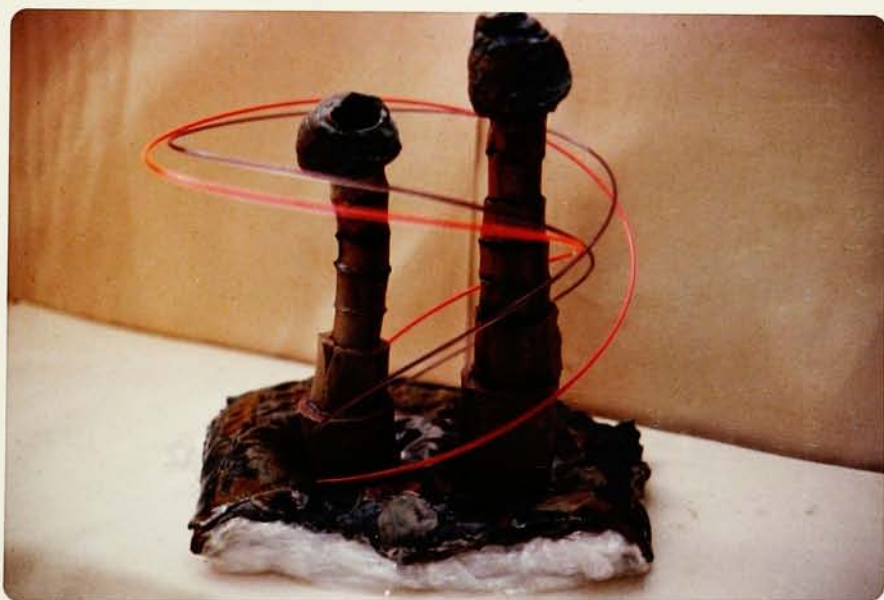
glazed, I do not feel negatively about painting on clay, particularly if the piece is not functional. In fact, I feel painting has one big advantage over glaze, and that is its immediacy. Paint can be reworked till the proper effect is achieved, where the reworking of glazes is interrupted by firing days.

The second piece in this series, Growing, (Plate 34 and 35) is another simple idea of something organic coming from two separate things. The plastic tubing was added as an extension to the organic part, to emphasize the transparency of the plastic tube and the opacity of the clay. It was stuffed with paper towels soaked in dilute Day Glow paint, wired to the clay, and melted some in an electric kiln on low for about 20 minutes to make it look more a part of the piece. I feel here too that the combination of melted plastic with clay has many exciting possibilities, and think I'll be trying to do more later on.

In Plate 36 and 37 a different more mechanical kind of clay tubing is used. These clay sections must be cut so they will create the proper angle when attached to the one preceding it. It is a painstaking job when doing a number of tubes which wind in and out with quite a few directional changes such as in the Momma. Meeting is a simpler version. In it two little tube creatures have floated and weaved themselves into a position in which they can meet and talk with one another. The airy environment around them is defined by two plexiglass



Plates 34 and 35. Growing, 12" length;
Plastic tubing, paper and acrylics,
cone 9 glaze.



Plates 36. Meeting, 17" X 16" X 14";
Plexiglass rods, plastic bags, cone 9
glaze.

Plate 37. Momma, 13" height; Plastic baby
and bag, cone 9 and 5 glazes.



Plate 38. We Make Everything Here, But Hamburg Best,
15" X 12" X 15"; Plexiglass, cone 9 glaze.

rods wedged in at the base held in shape by their own tensile strength and two pieces of nylon fishing leader. The plastic also emphasizes the opacity and non-elasticity of clay by its own reflectivity and flexibility. In Momma, the heads of the tube creatures widens to become the baby holder, and plastic is used simply as a cover to shield the baby a little from our direct gaze. Blue plastic, a little opaque, was used to relate better to the dry blue glaze on the piece.

In We Make Everything Here, But Hamburg Best (Plate 36) clear plexiglass is used for its transparency, and for contrast with the heavy shapes of the machine as it separates the dome from the base. The piece is all message: I think of it as a political cartoon. It is, of course, a comment on the great American Nation's senseless and prolonged "involvement" in the Vietnamese war. Men are being herded on hands and knees, forced to crawl up the back of a (Capital) hill, and squeeze through a crack in the bottom of some great machine. Through the plexiglass window they are seen clumped, one on another's shoulders, on their way to be ground. And the shreds come out of the machine, and gather on the front of the hill.

FIBERGLAS

When the piece in Plates 6 and 7 was drying, the front and back slabs, being unfortunately thinner and drier than the coil sides shrank at a faster rate than the sides. Also, the

great weight of the piece was all pressing down on the bottom, which was sitting directly on the table. When the bottom needed to shrink it couldn't slide because of all the weight, and a big crack 1" wide developed across the middle of the bottom and tapered halfway up each side. (The next time I'll dry a big heavy piece that has a large bottom area up on some sort of stilts to dry it more evenly from all sides, and would even put the stilts on rollers, to allow the clay to move when it needs to.)

To patch the crack I smashed a large handful of the same clay, added vinegar which does not expand and crack dry clay like water would, and added a pinch of chopped Fiberglas. I mixed it to a workable-clay consistency, scored the clay around the crack, and patched the piece from both the inside and outside, as completely as I could. It dried without further cracking, and came through the bisque firing too without a crack. During that firing it was on pieces of kiln shelf that were on rollers. During the glaze firing it was not, but it escaped with only a shallow thin crack that did not go all the way through. The glaze covered the patch without serious fit trouble too.

Fiberglas (trade name of Owens Corning) or glass fiber in a clay body works well for patching jobs like this because, as it doesn't absorb as much water as clay particles, it contributes a lower rate of shrinkage.

It was suggested that I add $\frac{1}{2}$ % chopped Fiberglas to

my handbuilding body to make stronger slabs and to produce less shrinking and cracking in the drying process. I was using Bob Garren's clay body, modified slightly to include A.P.Green PBX (Valentine) fire clay instead of red iron oxide.

Clay Body Cone 5-9	
Kentucky "Special" Ball Clay	25
Goldart	25
A P Green "Missouri" Fire Clay	15
A P Green PBX (Valentine) Fire Clay	10
Spodumene or Feldspar	15
Bentonite	1
Chopped Fiberglas	$\frac{1}{2}$ %
Grog to suit	

This clay body alone is good for handbuilding, not sticky, plastic and strong. The addition of Fiberglas is not detrimental in any way to the workability of the clay, and it does make slabs stronger, i.e. able to stand by themselves sooner, and aids in the drying process by reducing shrinkage. Pieces shown in Plates 13, 14, 15, 16, 17, 18 plus certain platters and mirror plaques were made with the clay with $\frac{1}{2}$ % Fiberglas. In pots that had lids the clay seemed to soften just enough to cause the lid to conform exactly to the pot top. In Winged Victory for example, the lid once in place will not move even a fraction of an inch. This is a little bonus of the Fiberglas I find pleasing.

However, for platters that slope gently upward, like the square sling-molded platters, the clay with Fiberglas is not good. This clay, having been rolled into a slab and cut into a square, is gently pressed into the sling mold and shaped to have smoothly curving sides, as is other clay. Only rarely will this clay dry the way it was left. Nearly always it warps and one or more sides will have developed buckles. It seems the Fiberglas-clay has more of a "memory" than clay without it, maybe because during the rolling the strands are lined up to create a flat slab and resist the change imposed by the sling mold. Also, during glaze firing, when the temperature goes close to cone 10, the clay softens and slumps. I have several platters that are now just about flat and must be used as tiles instead of plates. Probably the omission of some or all of the Feldspar (or Spodumene) would raise the melting point of the clay sufficiently so that the addition of fiberglas would not cause this slumping in platters, but probably it would still have its tendency to buckle in the sling mold.

In one particular piece, Bowl in Plates 13 and 14, I noticed what seemed to be a much greater than previously noticed rate of shrinkage after being fired to cone 9. Though it seemed reasonable that the Fiberglas would melt away at cone 9 and cause a much greater shrinkage in the clay body, tests proved this was not true. In fact, clay with $\frac{1}{2}$ % chopped fiberglass shrinks significantly less, in both dry and cone 9 measurements,

than do other cone 9 bodies currently in use here. I tested four stoneware and one porcelain body and found their dry shrinkage rates were 7 %, 6 %, 6 %, 5 %, 7 %, with an average of 6.1 %; the dry shrinkage of the clay with fiberglass was 3.5 %. The cone 9 shrinkage for the same bodies were 14 %, 13.5 %, 14.5 %, 13 %, 13 %, with an average of 13.6 %; the cone 9 shrinkage of the clay with fiberglass was 10 %. The bar of clay with fiberglass was, however, warped much more than were the others, though warping does not cause a noticeable difference in the shape of my three dimensional pieces.

There have been several problems with glaze fit, most notably in Waxy White and Grey Transparents, which both develop crazes over this clay with Fiberglas. The coefficient of thermal expansion was lowered and the craze reduced in Waxy White by substituting gram for gram Cornwall Stone which has as its chief RO member calcium (coefficient of thermal expansion 5) for Clinchfield which has as its RO member potassium (coefficient of expansion 9.5). The craze may be further reduced or eliminated by using only 100 grams of Cornwall Stone and 23 spodumene (which would supply some lithium) for the original 123 grams of Clinchfield. I have not yet had time to follow up on this test, nor to correct the lesser craze in Grey Transparent. The latter could probably be corrected by using only 100 parts Nepheline Syenite and 35 parts spodumene for the 135 parts of Nepheline Syenite in the original formula,

or by adding 3 % lithium carbonate to the original formula.

Despite these little problems of glaze fit, I will probably continue to use Fiberglas in my clay when building three dimensional pieces. Its extra strength and small amount of shrinkage is quite desirable, as is the resulting fine fit of lidded pots. For flat wall pieces too, the Fiberglas clay will be fine. In making platters, however, I think I'll use clay without Fiberglas in order to get curved slabs to dry without buckles.

LUSTER GLAZES

Most recently I've been trying to develop some low fire luster glazes to contrast with and accent cone 9 glazes and clay body. I want to fire pieces first to cone 9, and then add the luster glaze and refire. I've been doing my tests in the small electric test kiln, and would do all the lustering in as small and as air tight a kiln as possible because during the cooling process a strong reduction atmosphere must be established and maintained by plugging the kiln as tightly as possible.

In producing lusters it seems it is important to reduce the glaze very strongly at dull red heat, or about 1400°F. on the test kiln pyrometer here. In firing my glazes, I reached temperature cone 010, in about 5 hours, then turned the kiln off and waited about 1½ hours for it to cool to 1400°. Then I

opened the door, quickly deposited some rubber (about the amount in a man's shoe rubber) in the kiln, and closed and plugged around the door, and the spies with clay. A thick yellow smoke that I tried to avoid breathing poured out of the kiln, but is immediately sucked up and out by the exhaust system. This heavy smoke only lasts about 10 minutes, and so the kiln room is unpleasant for only a short time. This is the only reduction introduced into the firing cycle, and it is sufficient to produce lusters. (A slight variation follows: Let the kiln cool to about 1360^o, turn the elements back on Hi for about 20 seconds, open the door and deposit rubber, close door, turn off and plug kiln. The temperature was cooled below 1400^o to determine whether a scumming effect should be corrected by reducing at lower temperature, but that was corrected instead by firing only to cone 010 rather than cone 09. Reducing at 1360^o seemed no different than at 1400^o. The kiln was turned on before and during opening the door to encourage the temperature to return nearer to what it was before the heat loss of opening the door. No big difference was noticed in the results of this firing, and though I will fire this way in the future I don't think it is as crucial to the resulting lusters than the maturing temperature and the amount and duration of reduction.)

For reduction I used at first a whole man's shoe rubber. I found that less than that resulted in glazes that were partly oxidized, i.e. had areas of copper blue or green. Later I tried a piece of rubber from a tire, and then a section

of a tire inner tube. I believe both work equally well. It just must be in great enough quantity to supply the necessary amount of reduction for the duration of time that the lusters are forming. The kiln must be well plugged to aid in keeping the reduction atmosphere, and should be loaded so that no piece is shielded from the smoke.

Opaque Opalescent Luster Glaze--Maturing Temp Cone 09

Reducing Temp 1360°F

Frit 5301	100
Gerstley Borate	10
Copper Carbonate	1.5
Silver Nitrate	1
Bismuth Subnitrate	1

This glaze gets quite metallic gold where thin, and where thicker has opaque cream white color with an opalescent sheen of blue, yellow, gold, magenta, etc...

I've found so far that it looks good over Grey Transparent, and that Grey Transparent does not change its quality drastically by being refired in this manner as some cone 9 glazes do. It also is interesting when seen over Mix Red, as this cone 9 glaze loses most of its copper red in this refining and becomes a mottled pink and greyish opaque glaze that complements the opalescent luster nicely. This luster also works well over Victor Slip, but does not so far appeal to me over the

darker Iron Crystal glaze.

Orange Luster Glaze--Maturing Temp Cone 09

Reducing Temp 1360° F

Frit 5301 100

Copper Carbonate 3

This glaze seems to be most successful where thin. It produces what I find a pleasing range color glaze with strong metallic luster with reflections of blue, magenta, purple, etc... (Lusters are hard to describe.)

There is one more luster that appeals to me, but is not quite as dependable as the above two. It is:

Purple Luster--Maturing Temp Cone 09

Reducing Temp 1360° F

Frit 5301 100

Silver Nitrate 1

For the purple color and metallic luster the application must be very thin, I've found, and the reduction on the heavy side. If the glaze is thick it will be an opaque cream color, and if not heavily reduced no metallic purple will appear.

It should be mentioned that in the preparation of these glazes I found it necessary to grind the silver nitrate

and bismuth subnitrate with a mortar and pestle before adding them to the frit. Also, as these glazes were added to already matured clay they were brushed on after the pieces were heated in a kiln to ensure a heavy enough delivery of glaze.

I only have one piece other than test shards glazed with lusters. That is seen in Plate 39, which was glazed with Grey Transparent and Victor Slip and fired to cone 9, then reglazed in parts with Opaque Opolescent and Orange Luster and fired to cone 09.

CONCLUSION

With great help from Professor Cowles I have developed a number of slips and glazes that produce effects that are esthetically pleasing to me, and that I want to use to complete the expressions of my handbuilt pieces. The various attempts recorded here at glazing my pots in the "spirit" in which they were made, along with the passage of time, have brought me closer to realizing what the final firing should do in the making of a good piece.



Plate 39. Lustered Pot, 6" height; cone 9 glazes brushed and fired, cone 010 lustered glazes added.