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# Fluted and faceted porcelain

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# FLUTED AND FACETED PORCELAIN

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CONTENTS

I. HISTORICAL BACKGROUND . . . . . 1

II. AESTHETIC CONCERNS . . . . . 7

III. TECHNIQUES . . . . . 10

IV. ASSESSMENT OF THESIS POTS . . . . . 16

. . . . . .

APPENDIX: CLAY AND GLAZE RECIPES . . . . . 38

BIBLIOGRAPHY . . . . . 43

ILLUSTRATIONS


1. Surform Blades . . . . . 12

2. Pressure Cracks . . . . . 13

3. Covered Jar Glazed in English Celadon . . . . . 17

4. Covered Jar Glazed in Scrap Celadon . . . . . 18

5. Covered Jar Glazed in Grebanier Blue Celadon . . . . . 19

6. Jar Glazed in A.M.E. Base with Ilmenite . . . . . 20

7. Covered Jar Glazed in Ochre Celadon . . . . . 21

8. Covered Jar Glazed in A.M.E. Base with Ilmenite . . . . . 22

9. Vase Glazed in Nelson Green Celadon . . . . . 24

10. Jar Glazed in Nelson Blue Celadon . . . . . 25

11. Vase Glazed in Grebanier Blue Celadon . . . . . 26

12. Covered Jar Glazed in Alfred Yellow . . . . . 27

13. Prototype Place Setting Glazed in Nelson Blue Celadon . . . . . 28

14. Conical Form Glazed in Cornish Orange . . . . . 29

15. Conical Form Glazed in Ochre Celadon . . . . . 31

16. Conical Form, Interior Glazed in Alfred Yellow, Exterior Glazed in A.M.E. Base with Ilmenite . . . . . 32

17. Conical Form Glazed in Babu Blue Celadon . . . . . 33

18. Conical Form Glazed in Ochre Celadon . . . . . 34

19. Basket Form Glazed in Grebanier Blue Celadon . . . . . 35

20. Basket Form, Interior Glazed in Alfred Yellow, Exterior Glazed in A.M.E. Base With Ilmenite . . . . . 36

# I. HISTORICAL BACKGROUND

The tradition of decorating ceramic ware seems to be as old as the production of pottery itself, and the idea of cutting a pattern into the walls of a pot has enjoyed an enduring popularity. The two techniques commonly used are faceting (slicing flat panels) and fluting (cutting parallel grooves or channels).[1] Examples of these types of surface treatment have been produced in Europe, the Middle East, and Asia since prehistoric times, and were inspired by a variety of sources.

Some potters were influenced by contemporary metalwork. Typical features such as rivets, strap handles, and planes joined at a sharp angle (suggesting sheet metal construction) were imitated, and occasionally entire vessels were translated from one medium to the other. Since the ownership of metalwork was usually limited to the wealthy and powerful upper class, the more easily obtainable ceramic versions were in demand among those who wanted to display similar signs of privilege but could not afford the originals. It would be a mistake, however, to assume that all formal elements were introduced by the metalworkers. There was an interchange of creative ideas, and there were also examples of metal being used to imitate ceramics.[2]

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[1] Thomas Shafer, Pottery Decoration (New York: Watson-Gupil Publications, 1976), pp. 33-4.

[2] Walter Trachsler, "The Influence of Metalworking on Prehistoric Pottery: Some Observations on Iron Age Pottery of the Alpine Region," in Ceramics and Man, ed. Frederick R. Matson (Chicago: Aldine Publishing Co., 1965), pp. 140-41.

Examples of pottery decorated with designs derived from metalwork appear throughout the world in virtually every time period. During the Bronze Age in Anatolia, burnished monochrome ware was often embellished with fluting, and the style reached its height during the early years of the Hittite Empire in the sixteenth century B.C. Similar ware appeared in Syria and Palestine during the same era, and is thought to stem from the same tradition.[3] In the ceramics of the Alpine region during the period between 1200 and 600 B.C.,

> . . . the preferred decoration is fluting and incision. Together with the brilliant dark surface, they evoke that "metallic look" which ceramists would hardly term genuine invention in clay, but, far more likely derivative . . . . It is their general structure which suggests an association with metal, especially with sheet metal.[4]

In China during the Shang dynasty (1525-1027 B.C.), fine grained clay bodies played a vital role in the newly developed technology of bronze casting. Only molds made of clay could be intricately shaped and subsequently withstand the temperatures necessary in the casting process. Ceramic vessels similar in design to the bronzes were produced during the same period, and the question of priority has been raised. Some experts believe that the pots were inexpensive versions of the bronzes,[5] while others feel that the incised designs and tripod shapes of the early bronzes suggest

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[3]J. B. Hennessy, "The Ancient World: Prehistoric Near East," in World Ceramics, An Illustrated History, ed. Robert J. Charleston (New Jersey: Chartwell Books Inc., 1968), p. 25.

[4]Traschler, "Alpine Pottery," p. 144.

[5]Yutaka Mino, "Brief Survey of Early Chinese Glazed Ware," Artibus Asiae 37 (1975): 44.

clay prototypes.[6] Both influences were probably at work, with a fusion of ideas resulting in an overall style that affected a variety of media.

Over a thousand years later during China's T'ang dynasty (618-906 A.D.), a series of faceted and elaborately ornamented white wares were manufactured. This was the result of the strong appeal of Persian metalwork,[7] and an abrupt differentiation of parts is characteristic of the ceramics of this period in general. By the time of the Sung dynasty (960-1279 A.D.) fashion had changed again. Overall shapes were more flowing and integrated,[8] and the use of flat-sided forms was limited to specialized wares such as the slab-built Chün flower pots and bulb bowls. T'ang ceramic conventions were then adopted by the potters of Korea, where examples of cut-sided jars and vases appeared during the Yi dynasty (1329-1910 A.D.).[9] The influence of Chinese culture then moved toward Japan. Roughly faceted Black Seto tea bowls were produced there during the Momoyama period (1568-1614 A.D.),[10] and a faceted sakè container of Early Imari ware made during the early seventeenth century[11] is almost identical in form to Yi dynasty works.

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[6]John K. Fairbank, Edwin O. Reischauer, and Albert M. Craig, East Asia: Tradition and Transformation (Boston: Houghton Mifflin Company, 1973), p. 27.

[7]Susan G. Valenstein, A Handbook of Chinese Ceramics (New York: The Metropolitan Museum of Art, 1975), pp. 50, 56.

[8]Sherman E. Lee, A History of Far Eastern Art, revised ed. (New York: Harry N. Abrams, Inc., 1973), p. 359.

[9]"Pots of Inspiration: The Personal Collection of Bernard Leach," Ceramics Monthly 28 (December 1980): 48, 50, 56.

[10]Soame Jenyns, Japanese Pottery (London: Faber and Faber Limited, 1971), p. 151.

[11]Tsugio Mikami, The Art of Japanese Ceramics, The Heibonsha Survey of Japanese Art, vol. 29, trans. Ann Herring (New York: John Weatherhill, Inc., 1972), p. 66.

During the first half of the seventeenth century, Oriental porcelain strongly influenced ceramic styles in Europe as Delft potters copied both the characteristic shapes and painted decoration.[12] In 1710, Meissen became the first European factory to produce true porcelain, and began by copying both Chinese prototypes and German silver forms. (There is even a record of a factory employee being sent to a fair in Leipzig to "gather a few drawings of the Augsburg silver-plate.")[13] The result was a variety of flat-sided ceramic forms with thin handles. Rival companies arose almost immediately, and in turn copied the forms of Meissen porcelain. Ware was still imported from the Orient, and some pieces were manufactured there specifically to satisfy European taste:

> . . . the [East India] Company's representatives were promptly dispatched with models, as well as designs in silver, and instructed to have them copied as nearly as could be at Ching-tê Chên . . . Candle-holders, teapots, coffeepots, casters, salts, plates, tea-caddies, milk-jugs, trays, sauce-boats, tureens, and bouillon pots were all copied from silver models in China.[14]

The blending of these influences resulted in the establishment of the repertory of traditional shapes that has been produced by the ceramic industry ever since.

Ceramic decoration was also influenced by contemporary glass and

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[12] O. Van Oss, "Europe, The Tin-Glaze Tradition: The Influence of China and Dominance of Delft (1630-1700)," in World Ceramics, ed. Charleston, p. 166.

[13] K. Berling, ed., Meissen China: An Illustrated History (originally Festive Publication to Commemorate the 200th Jubilee of the Oldest European China Factory, Meissen. Meissen: Royal Saxon China Manufactory, 1910; reprint ed., New York: Dover Publications, Inc., 1972), pp. 5, 12.

[14] Michael Beurdeley, Chinese Trade Porcelain (Rutland, Vermont: Charles E. Tuttle Co., 1962), p. 50.

lapidary work. Roman potters during the second century A.D. imitated the faceting of cut glass by incising their vessels while they were still soft.[15] In Saxony in 1710, Johann Friedrich Böttger used a different technique to obtain a similar effect. He produced a vitreous red stoneware that was embellished by "cutting, engraving, and polishing it, as one would a precious stone"[16] after the ware was fired.

Observation of the natural world also gave rise to various decorative patterns. Böttger stoneware was sometimes decorated in a pattern called Muscheln, which was made up of a series of connecting hexagonal facets. This was probably inspired by the mussel shell, and after the middle of the eighteenth century in England, Bow and Derby created centerpieces of dishes in the shape of scallop shells.[17] Lobed pots made during the Sung dynasty in China,[18] the latter portion of the Koryo dynasty (918-1392 A.D.) in Korea,[19] and the seventeenth century in Japan[20] are reminiscent of gourd and melon forms. Fluted ware imitating the texture of bundles of bamboo

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[15]Robert J. Charleston, "The Ancient World: Rome," in World Ceramics, ed. Charleston, p. 36.

[16]S. Ducret, "European Porcelain: Meissen," in World Ceramics, ed. Charleston, p. 216.

[17]George Savage and Harold Newman, An Illustrated Dictionary of Ceramics (New York: Van Nostrand Reinhold Company, 1974), pp. 199, 262.

[18]Robert Fournier, Illustrated Dictionary of Pottery Form (New York: Von Nostrand Reinhold Company, 1981), p. 180.

[19]René-Yvon Lefebvre d'Argencé, gen. ed., 5,000 Years of Korean Art (San Francisco: Asian Art Museum of San Francisco, 1979), p. 165.

[20]Masahiko Satō, Kyoto Ceramics, Arts of Japan, no. 2, trans. and adapt. Anne Ono Towle and Usher P. Coolidge (New York: John Weatherhill, Inc., 1973), pp. 31, 44.

was also produced throughout the Orient,[21] and is thought to have inspired the cane-ware introduced c. 1770 in England by Wedgewood.[22] A similar motif, referred to as reeding, decorated such diverse works as an Italian hydria of the third century B.C. and creamware teapots produced c. 1780 in England by Leeds.[23] The subtle fluting of Sung dynasty Lung Ch'uan[24] and Honan Temmoku[25] wares may have been derived from a similar source. Styles ranged from literal representations of objects to almost complete abstraction, but the unifying theme was the repetition of simple geometric elements (parallel lobes, ribs, or channels) over the surface of the forms.

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[21] Fournier, Pottery Form, p. 12; d'Argencé, Korean Art, p. 166.

[22] Savage and Newman, Illustrated Dictionary of Ceramics, p. 36.

[23] Ibid., pp. 154, 158, 243.

[24] Lee, Far Eastern Art, p. 369.

[25] Valenstein, Chinese Ceramics, p. 78.

## II. AESTHETIC CONCERNS

When pots were first made, their primary function was to hold food or drink. Although clay has subsequently been put to many other uses, this original role provides the basis of ceramic tradition. My work is an exploration of the ways that cut decoration can be related to these conventional dinnerware and container formats. I am interested in making pots that function on more than one level: they could conceivably be used every day, but are ornamental enough for special occasions, and can also be appreciated simply for their formal qualities.

Shape and visual movement are primary concerns. The pattern of surface decoration must relate to the piece as a whole. A visual rhythm is set up by repeating an element, such as a curved channel, over the surface of the pot. This can be further manipulated by varying the length, width, and balancing textured areas against smooth ones. In some cases the decoration acts as a frieze that is applied to a section of the exterior, stopping just short of interfering with the ability of the piece to function. This involves taking certain liberties with traditional forms. Plates are larger than normal since the fluting around the rims covers fully half to a third of their surface, and vertical forms such as bowls and cups are elevated so that their carved sides can be clearly seen. In other cases the decoration covers the entire pot, obscuring the original construction method. The cuts then imply an underlying structure made up of geometric modules, and their placement

determines how the eye moves across the form. Freed from the constraints of strict function, these abstract, sculptural concerns are explored more fully in a series of conical and basket forms. It is a question of proportion, so the visual success of each piece is determined by the way the elements of the design begin, intersect, end, and modify the contours of the pot. The evolution of ideas and the decisions made regarding individual pieces are traced in greater detail in section IV, Assessment of Thesis Pots.

Light and glaze quality also affect perception, and these characteristics are directly related to the type of clay used to make the form. One reason I use porcelain is because of the way it reacts to light. Areas where the body is thin are translucent when illuminated, while thicker areas emit a warm glow. The color of a glaze is also clearer when applied over a white surface, an effect that is heightened since some of the light passing through the glaze is reflected from the clay body back toward the viewer. As for the characteristics of individual glazes, a transparent, shiny one allows virtually all of the texture in the cut decoration to be seen, while permitting a maximum amount of light to be transmitted and reflected. At the other extreme, a buttery matt absorbs light while smoothing out overall contours by obscuring sharp edges. The potter can therefore control how much detail is to be revealed.

I try not to allude to a single, specific image when planning the shape and decoration of a pot. It is relatively easy to duplicate an existing form, but once the novelty of the illusion has worn off, there is nothing left to interest the viewer. Philip Rawson remarks that ". . .

there are surface treatments which can have fairly obvious and direct symbolic references; for example, bevelled criss-cross cutting may forcefully suggest the skin of a pineapple."[26] I discovered this independently the first time I cut across parallel facets on an oval covered jar and did not like the result: the reference was too direct and exclusive. It is much more effective to combine features from a variety of sources. This ambiguity makes possible the creation of a visual metaphor in which the analogies that are perceived vary according to the individual viewers' experiences and memories. I do not, however, find it useful to go consciously looking for design elements to translate into ceramic terms. Peter Lane describes how ideas often arise:

> Creative thought usually develops through a process of assimilation, through the merging of feelings, images, and experiences, and from things seen and heard and touched. It may be difficult to pinpoint exactly the origin of a specific idea pursued in clay . . . because the boundary between conscious and unconscious response is often blurred.[27]

It is only in retrospect that my pots remind me of fan vaulting, geodesic domes, colonnades, crystals, or cut glass.

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[26]Philip Rawson, Ceramics, The Appreciation of the Arts, vol. 6 (New York: Oxford University Press, 1971), p. 85.

[27]Peter Lane, Studio Porcelain: Contemporary Design and Techniques (London: Pitman House, 1980), p. 28.

## III. TECHNIQUES

Over the years, various methods have been used to cut patterns into the surfaces of pots. Faceting changes the shape of a piece by slicing flat panels from its sides. This is usually done with a knife, a section of wire held taut between both hands, or a cheese slicer (a wire cutter, often backed by a small roller guide to prevent deep sections from being removed with a single slice). Pieces that are to be faceted must be made with thick walls to allow for the amount of clay that will be taken off during the decorating process, and it is sometimes necessary to slightly flatten the sides of a pot first as a precaution against trimming all the way through the walls. Fluting involves the cutting out of concave areas or channels. A wire loop tool is often used, and the shape of the groove that it produces depends on the profile of the individual tool. A metal strap which has had one end sharpened can be used to shave away shallow, V-shaped sections. Thomas Shafer describes a Japanese-type fluting tool:

> To make the tool, a hole (1/4" to 1/2" diameter) is drilled about 1" from the end of a thin, flat piece of soft metal (e.g., strap steel or aluminum) about 1" wide and 6" long. The rim of the hole is flared, using a balpeen hammer; then the long end of the tool is clamped in a vise with about half the hold covered, and the short end is bent to a 45° angle. The cutting edge of the hole is sharpened with a round file, and the tool is ready to use.[28]

Robert Schmitz uses a similar tool, which is made by removing a section from the back of a spoon and sharpening the edges of the resulting hole. Both

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[28]Shafer, Ceramic Decoration, p. 34.

of these home-made tools hollow out a curved channel in the side of the pot.

After experimenting with the tools mentioned above, I found that I was not fully satisfied with any of them, and decided to use Surform blades instead (see fig. 1). These blades, manufactured by Stanley Tools to fit their line of files and planes, were designed to cut wood, rigid plastic, and similar materials. They work equally well on leather-hard clay. The blades are available in three profiles: 5/8 inch diameter round, 1 1/2 inch "half round," and flat. By using them singly or in combination, flutes and facets in a wide variety of shapes can be produced.

The working properties of the clay body used to make these forms is important, and I chose porcelain because of its texture. Porcelain has the fine, uniform particle size ideally suited to cut decoration. Crisp, precise edges can be maintained, and there are no large particles to leave drag marks or holes in the carved surface. The porcelain body I used (see appendix for recipe) also has good throwing properties, and the basic forms were all made on the wheel. The pots were usually thrown in one piece in an attempt to minimize future cracking problems. (The exceptions to this, the baskets, were made in two sections and joined while still wet to create a completely enclosed, hollow shape. I did this because of a back injury which made it difficult to throw with more than fifteen pounds of clay at a time. Fortunately these pieces showed no tendency to split along the seam.) The walls in areas to be fluted and faceted were left 1/2 to 3/4 inches thick, while those in undecorated areas were either thrown to final thickness or trimmed on the wheel at the same time that the piece was footed.

Fig. 1. Surform blades: 1 1/2 inch "half round" and 5/8 inch diameter round.

Fig. 2. Pressure cracks which first became apparent after the glaze firing.

The decoration was then cut into the walls at the leather hard stage. First, I roughly divided the available space into sections, making shallow marks as reference points. A pattern was planned to fill one section, and was then repeated in the remaining sections around the pot. The first set of cuts was made, and these completely covered the area that was to be decorated. I found that I preferred the rounded blades to the flat ones, since the lines that separated the flutes were more sharply defined. It proved to be easier to manipulate these blades without the handles designed for them by Stanley, so these handles were abandoned at an early date. Since I am right-handed, it was also more comfortable to make cuts that began at the upper right edge of the pot and ended at the lower left edge. Once the first layer of spiral or vertical cuts had been made they could either be left as they were or overlaid by a second series of cuts moving in the opposite direction. These secondary channels were spaced at wider intervals, allowing portions of the original pattern to show through. The areas where cuts met a lip or foot were then refined to their final shape.

Various difficulties arose during the decorating stage. The moisture content of the clay body proved to be critical. If the piece was too wet it would deform under pressure and the blades would clog. If too dry the walls were remarkably brittle and the blade had to be very sharp in order to cut effectively. It was not unusual to encounter both conditions on the same pot as it dried out during the decorating process. Misjudging the thickness of the wall and cutting through it, or simply cracking it with excessive pressure was also possible, and attempts to mend greenware were not effective. Occasionally pressure cracks would not be apparent until

they opened during the glaze firing (see fig. 2), but in general, the losses occurred as the pieces were being decorated.

After drying, the pots were bisque fired to (Orton) cone 08. Some minor damage incurred by the bisque ware could be repaired. If the section broken off was small and not subject to much stress, it could simply be reattached with Elmer's glue and glazed over. The glue held the piece in place until the glaze softened and permanently bound the break together. Small cracks could be tightly filled with a paste made of Elmer's glue thinned with water and some of the bisqued clay body ground into a powder. Tests were also made in which Duncan's "Patch-A-Tatch" ceramic cement was added to this mixture, but it tended to shrink and discolor at high temperatures.

Once bisqued, the pieces were glazed (see appendix for recipes) and fired to cone 10 in a downdraft kiln. In a typical firing the atmosphere was oxidizing until cone 08 was reached. The kiln was then heavily reduced for fifteen minutes, a light reduction was maintained until cone 10, and another fifteen minute period of heavy reduction was followed by a two minute oxidizing clear before the kiln was shut off. It was mentioned earlier that individual glazes were chosen for their ability to reveal or obscure texture. In many cases these qualities were dependent on the cooling cycle of the firing. A clear, shiny surface resulted from a firing in a small kiln that cooled quickly and a crystalline matt had time to develop in a larger, tightly stacked kiln that cooled more slowly. The individual kiln used to fire the pieces therefore had a dramatic effect on their final appearance.

## IV. ASSESSMENT OF THESIS POTS

The initial series is one of egg-shaped covered jars. The first (fig. 3) is decorated with a simple spiral. Figure 4 represents the first attempt at overlaying one series of cuts with another, resulting in the "pineapple effect" mentioned earlier. A conscious effort was made to vary the spacing on the third piece (fig. 5) to avoid this. Overall, the three jars are visually successful, although the shape of the lid on the third is not as well integrated with the overall form as the other two are. There is, however, one serious functional flaw. Both the areas where the lids sit and the edges of the lids themselves are gently rounded, so the lids slide off the jars very easily. Since these areas are glazed and therefore slippery, the problem is aggravated.

I tried to correct the problem on the next two jars (fig. 6, 7) by sharpening the curve's angle to give the lids a better seat, but they proved only slightly less likely to slip. The forms are more spherical than the previous ones, and a feeling of tension or inflation results. The modifying effects of glaze are also apparent here. The shiny, nearly colorless, transparent glaze (fig. 6) allows every detail to be seen without enhancing the underlying richness of the texture. Sharp edges are bared, emphasizing a bristling quality that discourages the impulse to touch. The less harsh, semimatt glaze (fig. 7) still reveals the underlying structure of the decoration, but softens the edges and renders the piece more approachable.

Fig. 3. Covered jar, h. 7 inches, glazed in English Celadon.

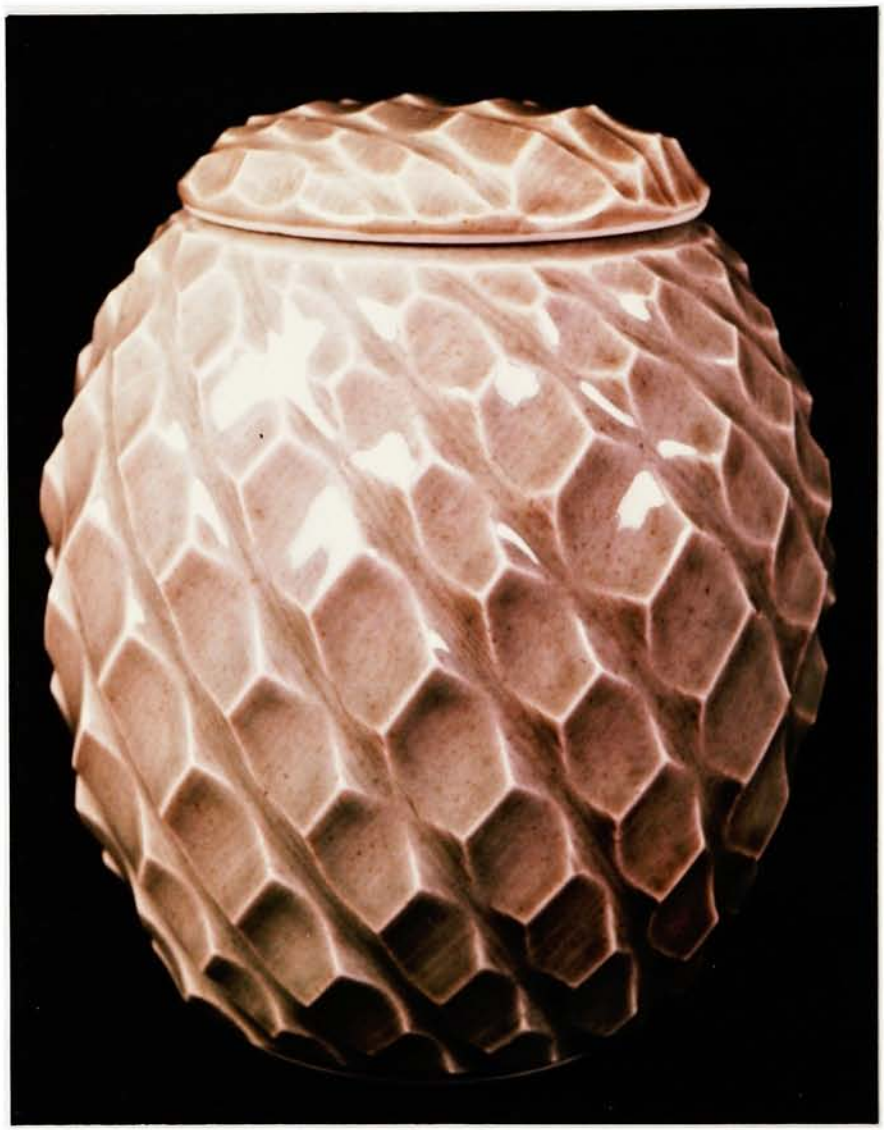

Fig. 4. Covered jar, h. 7 inches, glazed in Scrap Celadon.

Fig. 5. Covered jar, h. 7 inches, glazed in Grebanier Blue Celadon.

Fig. 6. Jar, h. 7 inches, glazed in A.M.E. Base with Ilmenite.

Fig. 7. Covered jar, h. 7 inches, glazed in Ochre Celadon (3% yellow ochre).

Fig. 8. Covered jar, h. 9 inches, glazed with A.M.E. Base with Ilmenite.

The glazes on the jars in figures 6 and 8 are actually the same recipe, but on the latter the glaze has crystalized over some areas of low relief. Even before glazing, the basic structure of the pattern on this piece is more subtle than that of earlier examples, and the matt coating obscures it to an even greater extent. The viewer is challenged to examine the jar closely if the logic behind the placement of the cuts is to be discovered. The pattern on the vase in figure 9 is essentially the same as that on the jar in figure 8, but since it is clearly visible, the effect is quite different. The form itself is not as successful. The neck and foot look as if they were added as an afterthought to the band of decoration. Broader undecorated areas with more definite profiles would have better counterbalanced the strength and movement of the pattern.

The final containers also contrast textured and untextured areas. Here the spherical form of the unlidded jar (fig. 10) is modified by extending and flattening the curve of the rim and foot areas. These sections mirror each other in height and profile, in effect "framing" the decoration. The vase (fig. 11) explores the same concerns with less success. The covered jar (fig. 12) carries the idea to its logical conclusion. The smooth areas have been flattened and undercut even more sharply, and are echoed in the straight sides of the cap lid. The resulting impression is that a textured sphere has had two L-shaped sections removed. Black glaze breaks to amber over the edges of the fluting, defining the pattern and providing a balance of dark and light tones. The combination of these factors makes this one of the most visually successful of the thesis pieces.

Figure 13 shows a prototype place setting for a dinnerware set. Designing pieces that would be both functional and visually related was an

Fig. 9. Vase, h. 10 inches, glazed in Nelson Green Celadon.

Fig. 10. Jar, h. 7 inches, glazed in Nelson Blue Celadon.

Fig. 11. Vase, h. 7 1/2 inches, glazed in Grebanier Blue Celadon.

Fig. 12. Covered jar, h. 6 1/2 inches, glazed in Alfred Yellow.

Fig. 13. Prototype place setting: dinner plate, w. 12 inches; luncheon plate, w. 10 1/4 in.; salad plate, w. 8 1/8 in.; dessert bowl, h. 2 1/2 in., w. 5 in.; soup bowl, h. 2 1/2 in., w. 5 3/4 in.; cup, h. 2 1/2 in., w. 4 1/8 in.; saucer, w. 6 1/8 in. Glazed in Nelson Blue Celadon.

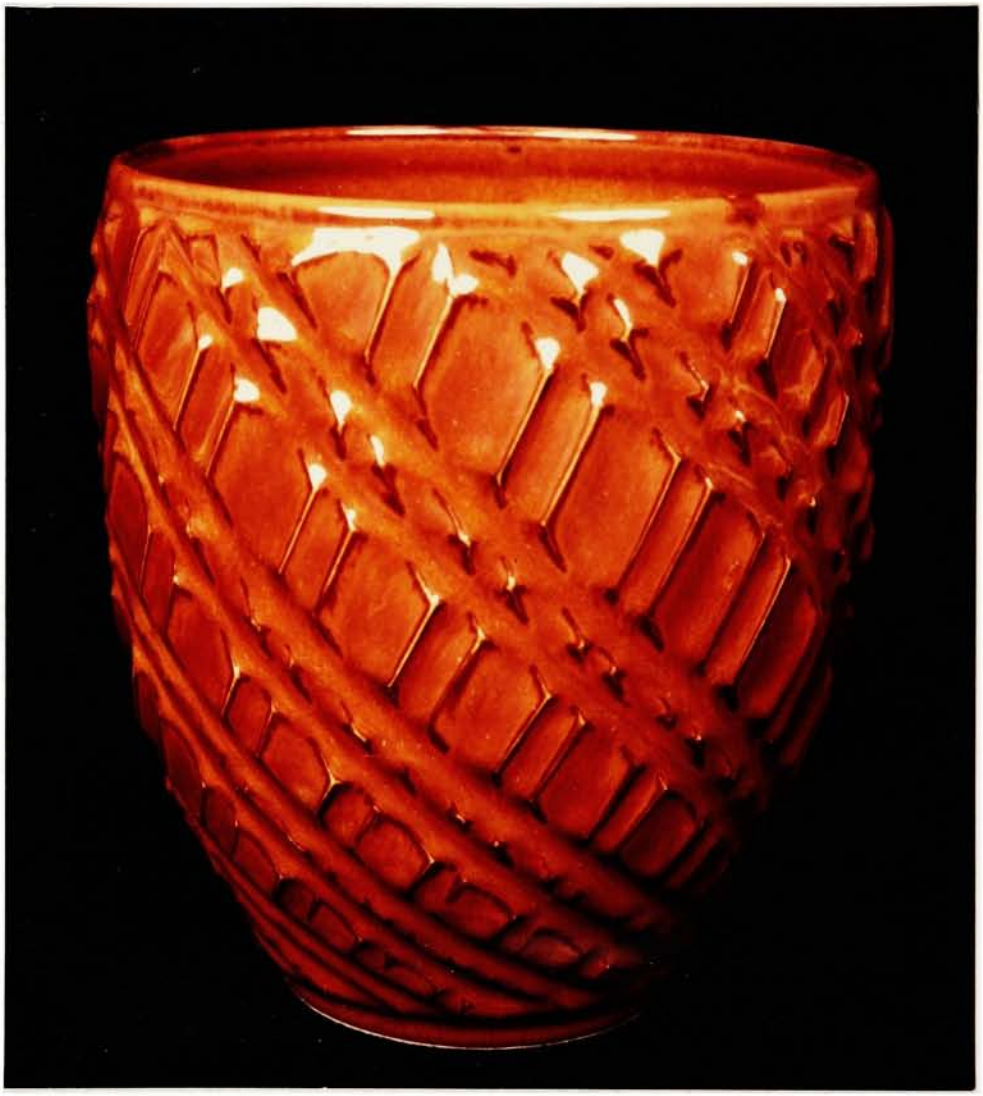

Fig. 14. Conical form, h. 8 inches, glazed in Cornish Orange.

interesting challenge, but if this set was put into production I would make various changes in it. First, the texture should be less pronounced. It is both difficult to clean and uncomfortable to handle, and on the vertical forms, looks rather grenade-like. On the teacup especially, cut edges should come no closer than a half inch to the lip rim, and the handle should be smoother. If the dinnerware was to be produced in any great quantity it would be more efficient to take molds from a series of prototypes and jigger or jolly the ware rather than throwing and decorating each piece individually.

That the series of conical forms begin in the context of tall, narrow bowls can be seen in figure 14. The pieces soon become more sculptural as the cuts are extended through the lip and foot (fig. 15). The next forms are taller and the bases proportionally narrower to allow more variation in the width of individual cuts and more space in which the spiral movement can take place. In figure 16, the contrast between smooth interior and patterned exterior is heightened by the use of a dark, shiny glaze on the inside of the piece, and a light, matt glaze on the outside. Comparing the last two conical forms (fig. 17, 18), the darker glaze emphasizes textural details that the lighter glaze washes out. Combined with the more deeply cut edges and more varied pattern of fluting, this makes figure 18 the more compelling of the two pieces. It would be interesting to push these forms to greater extremes, perhaps by enlarging the foot into a pierced pedestal or by exaggerating the thickness of the lip.

The baskets are literally extensions of the conical forms: the spiral cuts in figure 19 are simply allowed to continue upward until they flow

Fig. 15. Conical form, h. 7 inches, glazed in Ochre Celadon (3% yellow ochre).

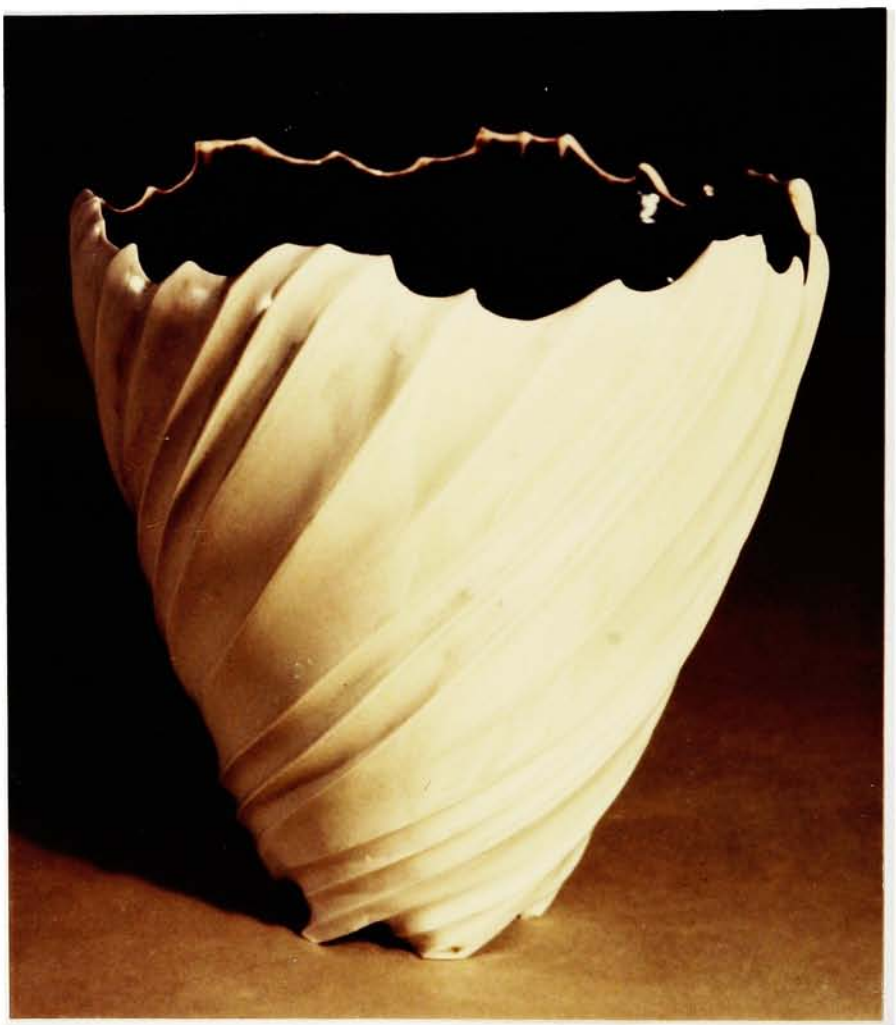

Fig. 16. Conical form, h. 9 inches, interior glazed in Alfred Yellow, exterior glazed in A.M.E. Base with Ilmenite.

Fig. 17. Conical form, h. 9 inches, glazed in Babu Blue Celadon.

Fig. 18. Conical form, h. 9 inches, glazed in Ochre Celadon (5% yellow ochre).

Fig. 19. Basket form, h. 12 inches, glazed in Grebanier Blue Celadon.

Fig. 20. Basket form, h. 12 inches, interior glazed in Alfred Yellow, exterior glazed in A.M.E. Base with Ilmenite.

together at the top. This is the only instance in which the idea for a pattern suggested the type of form on which it should occur. The second basket (fig. 20) adds the element of channels cutting across the primary lines of movement, and the darkly glazed interior focuses all attention on this punctuation of the exterior. The overall profile of these pieces is rather columnar and tentative. An inverted teardrop shape is one possible solution to the problem. Slip casting these conical and basket forms would result in the pieces' interiors echoing their exterior structure, and is another direction for future exploration.

# APPENDIX

## CLAY RECIPES:

| Mills Porcelain c/10 | |
|---|---|
| Edgar Plastic Kaolin | 32 |
| Kingman Feldspar | 22 |
| Kentucky O.M. #4 Ball Clay | 9 |
| Flint | 30 |
| Bentonite | 2 |
| | 95 |

| Mills Porcelain Modified c/10 | |
|---|---|
| Edgar Plastic Kaolin | 32 |
| Custer Feldspar | 22 |
| Kentucky O.M. #4 Ball Clay | 9 |
| Flint | 28 |
| Bentonite | 2 |
| | 93 |

When Kingman feldspar was no longer readily available, I modified the original porcelain recipe by substituting Custer feldspar and removing some of the flint to compensate for Custer's higher silica content. This clay is white, vitreous, translucent where thin, and has good throwing properties. Its dry shrinkage rate is 6%, there is no further shrinkage after a cone 08 bisque firing, and the total shrinkage when fired to cone 10 is 14%.

## GLAZE RECIPES:

| | Alfred Yellow c/9-10 R | | | | | |
|---|---|---|---|---|---|---|
| Cornish Stone | 40 | $K_2O$ | .07 | $Al_2O_3$ .52 | $5:O_2$ | 2.66 |
| Dolomite | 15 | $Na_2O$ | .06 | | | |
| Whiting | 10 | Ca O | .61 | | | |
| Kaolin (E.P.K.) | 25 | MgO | .26 | | | |
| Flint | 10 | | | | | |
| | 100 | | | | | |

Red Iron Oxide 3%
Rutile 5%

This glaze fires to a shiny dark brown, breaking to amber over sharp edges. When overfired it turns olive green with black streaks. It should be applied fairly thickly if the dark color is to be produced. The jar in figure 12 and the interiors of the forms in figures 16 and 20 are examples of its use.

A.M.E. Base with Ilmenite c/10 R

| | | | | | |
|---|---|---|---|---|---|
| Custer Feldspar | 33 | $K_2O$ | .08 | $Al_2O_3$ .14 | $SiO_2$ 2.00 |
| Dolomite | 11 | $Na_2$ | .04 | | |
| Zinc | 6 | CaO | .56 | | |
| Whiting | 17 | MgO | .14 | | |
| Kaolin (E.P.K.) | 11 | ZnO | .18 | | |
| Flint | 22 | | | | |
| | 100 | | | | |

Ilmenite 1%

The color of this glaze varies from a translucent, warm, light green to a white devitrified matt, depending on flame path, top temperature, and length of the cooling cycle of the kiln. It is used on the jars in figures 6 and 8, and on the exteriors of the forms in figures 16 and 20.

Babu Blue Celadon c/10 R

| | | | | | |
|---|---|---|---|---|---|
| Custer Feldspar | 40 | $K_2O$ | .16 | $Al_2O_3$ .40 | $SiO_2$ 2.27 |
| Whiting | 20 | $Na_2O$ | .07 | | |
| Kaolin (E.P.K.) | 10 | CaO | .77 | | |
| Flint | 30 | | | | |
| | 100 | | | | |

Tin Oxide 2%
Yellow Ochre 1%

This glaze is a slightly opaque baby blue. Ball milling for twenty minutes will thoroughly disperse the ochre and get rid of iron spots. It is used on the conical form in figure 17.

Cornish Orange c/10 R

| | | | | | |
|---|---|---|---|---|---|
| Cornish Stone | 83.3 | $K_2O$ | .16 | $Al_2O_3$ .48 | $SiO_2$ 3.60 |
| Colemanite | 2.9 | $Na_2O$ | .15 | $B_2O_3$ .08 | |
| Zinc Oxide | 2.0 | CaO | .60 | | |
| Whiting | 11.8 | ZnO | .09 | | |
| | 100.0 | | | | |

Rutile 2.5%
Red Iron Oxide 2.5%

This opaque orange glaze breaks well over texture, and turns a speckled rutile blue when applied thickly. The conical form in figure 14 shows the effect of a thinly applied glaze coat.

English Celadon c/10-11 R

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cornish Stone | 70.3 | $K_2O$ | .10 | $Al_2O_3$ | .40 | $SiO_2$ | 3.58 |
| Dolomite | 17.4 | $Na_2O$ | .16 | | | | |
| Kaolin (Grolleg) | 3.3 | CaO | .42 | | | | |
| Flint | 9.0 | MgO | .32 | | | | |
| | 100.0 | | | | | | |

Red Iron Oxide Precipitate 1.3%

This glaze fires to an unctuous, light green. It remains a buttery matt if not fired to at least cone 10, and is liable to trap carbon during a heavy glaze reduction. It is necessary to add suspending agents (2% Bentonite, 2% Epsom Salts) as the glaze settles out badly during storage. To lower the maturing temperature, try replacing some of the Cornish Stone with Kona F-4 feldspar. This glaze is used on the jar in figure 3.

Grebanier Blue Celadon c/9-10 R

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Custer Feldspar | 24.4 | $K_2O$ | .08 | $Al_2O_3$ | .36 | $SiO_2$ | 2.93 |
| Magnesium Carbonate | 24.1 | $Na_2O$ | .04 | | | | |
| Whiting | 3.0 | CaO | .77 | | | | |
| Kaolin (E.P.K.) | 18.8 | MgO | .11 | | | | |
| Flint | 29.7 | | | | | | |
| | 100.0 | | | | | | |

Black Iron Oxide 1%

This translucent, icy blue glaze is full of small, suspended air bubbles that occasionally cause pinholing problems. It is quite fluid at cone 10. Examples of its use are the jar in figure 5, the vase in figure 11, and the basket in figure 19.

Nelson Blue Celadon c/10 R

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Custer Feldspar | 44 | $K_2O$ | .19 | $Al_2O_3$ | .45 | $SiO_2$ | 4.22 |
| Whiting | 18 | $Na_2O$ | .08 | | | | |
| Kaolin (E.P.K.) | 10 | CaO | .73 | | | | |
| Flint | 28 | | | | | | |
| | 100 | | | | | | |

Yellow Ochre 2%

The translucency of this blue celadon is midway between that of Babu Blue and Grebanier Blue Celadon. Ball mill for twenty minutes to eliminate iron spots. Apply the glaze coat evenly, since changes in thickness are not completely smoothed out in the firing. This glaze is used on the unlidded jar in figure 10 and the place setting in figure 13.

| | Nelson Green Celadon | c/10 R | | | | |
|---|---|---|---|---|---|---|
| Kona F-4 Feldspar | 44 | $K_2O$ | .09 | $Al_2O_3$ | .47 | $SiO_2$ 3.90 |
| Whiting | 18 | $Na_2O$ | .18 | | | |
| Ball Clay (KY. O.M.#4) | 10 | CaO | .73 | | | |
| Flint | 28 | | | | | |
| | 100 | | | | | |

Yellow Ochre 2%

This celadon is a variation of the preceding one. The color is a warm green because of the titanium content of the ball clay. (Iron normally produces a blue color when fired in reduction, but it turns yellow in the presence of titanium. In this glaze the two optically mix, resulting in a green.) Figure 9 shows a vase using this glaze.

| | Ochre Celadon | c/9-10 R | | | | |
|---|---|---|---|---|---|---|
| Custer Feldspar | 36.5 | $K_2O$ | .13 | $Al_2O_3$ | .40 | $SiO_2$ 3.29 |
| Dolomite | 4.5 | $Na_2O$ | .06 | | | |
| Whiting | 18.2 | CaO | .72 | | | |
| Ball Clay (KY. O.M. #4) | 13.6 | MgO | .09 | | | |
| Flint | 27.2 | | | | | |
| | 100.0 | | | | | |

Yellow Ochre 3-5%

This green celadon is normally a translucent, mossy green as seen in figure 18, but can be the velvety matt shown in figure 15 if subjected to a long cooling cycle. The jar in figure 7 shows the effect of partial crystalization.

Scrap Celadon c/10 R

This glaze can not be accurately recreated since it is made up of the leftovers of a wide variety of celadon tests. It shows, however, that quite attractive glazes can be made by recycling old glaze scraps. An example of this glaze appears in figure 4.

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