Designing dinner plate prototypes for the contemporary table

Sandy Meg Beckerman

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Designing Dinner Plate Prototypes for The Contemporary Table
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INTRODUCTION

Above all, in the twentieth century tableware presents the designer with a unique challenge: given the industrialization and relative democratization of the marketplace, it is in many ways the ultimate mass-market commodity.

Every home in the modern world need such basic items as crockery, cutlery and glassware, and for that reason, the challenge of designing tableware has attracted some of the greatest architects and designers, artists and sculptors of the twentieth century.¹

I like to make things, particularly things that have a use. When I am given the choice of creating something that just "is" and something that has a "function" I will usually pick the latter. Maybe this is a result of growing up in an apartment in New York City where space is at a premium and there is only just so much room in which to spread out into and live. To me there is great joy in living with something that I created and an even greater joy at being able to use it. So even though the R.I.T. ceramics studio was filled with the buzz of artists creating highly conceptual vessels and sculptures, I never had any doubt in my mind that my thesis would be in functional pottery.

The questions thus became: what kind of pottery would I do? What form, color, and texture was I after? What kind of process should I use, and very importantly, what sort of aesthetic style was I after? Once the questions had been sorted through and organized, they became the thesis project that I submitted and worked on throughout the academic year and that I will summarize in this paper. My original thesis proposal as submitted stated:

My intention is to design and produce a number of dinner plate prototypes. The purpose of these plates is to bring quality in craftsmanship and personal design to the table without sacrificing function. I will adapt manufacturing techniques from the tableware industry so that they are suitable for the independent studio. I will use and possibly modify specific European traditional color schemes common in industry, to create new patterns for today's table.

This written thesis is comprised of three main sections. In the first section I will cover some of the issues I was dealing with and the reasons behind my decisions. The second section will be an analytical description of what the finished work looks like, and the third will describe the process of how I made the plates.
CHAPTER 1
WHY

Of all the issues I had to consider with this project, there were two main points that had the most impact on what I produced. One was my desire to raise my product quality to as high a level as I was capable of producing. The other was the look of the project. I was very determined that whatever I decided to make would have a strong contemporary style that reflected my own aesthetic taste and bias. In writing about tableware for Conran Design Guides, Jeremy Myerson and Sylvia Katz point out that "Table manners and objects say a lot about us the cultures to which we belong, the economic systems to which we adhere and our sense of our own style and status." Both of these issues, product quality and personal aesthetic, were very important to me and, like the chicken and the egg, I could not say which came first. After all, how the work was produced would impact not only its quality, but also the forms and the finishes I could achieve consistently. Likewise, the way I wanted the work to look affected the decisions I made in choosing which processes to use.

Some of the decisions I came to were based on my desire to narrow my focus, to create within a specific format. I find I work

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2Ibid.
best when I have limitations; without them I flounder at the overwhelming list of possibilities that are out there. Other decisions were based totally on practical things like my decision to use a cone 6 clay body. I could have used a cone 10 reduction clay body but I knew that after graduation I would probably not have access to a high fire gas kiln. This would mean my clay body and glaze formulas would then be useless. If I wanted to be able to use the same materials after graduation, in a small studio, I had to formulate them for what I would most likely have access to, namely a basic hobby electric kiln.

When using an electric kiln most people either fire to cone 04 or cone 6. I felt that work fired to an earthenware temperature of cone 04 was too soft and easily chipped for my purposes. The higher temperature of cone 6 was the practical solution since work fired to this temperature would be both vitreous and durable.

In looking for a production process adaptable to a small studio I decided to jigger my dinner plates. I chose to use the jiggering method because it allowed me to execute a more refined form than throwing would have. While the designing and set-up of the molds required would initially require a lot of time, once in place the actual jiggering would be quite quick, and consistent.

My desire to adapt manufacturing techniques when possible, came out of my desire to raise my quality level to as high a standard as my skills and available facilities would allow. The average person has come to think of craft as crude, poorly made imitations of household items. I believe this happened because the average un-juried local craft show is full of dried flower arrangements and wooden
ducks painted blue, with a lace ribbon tied around the neck. The work is priced low in order to sell, and in truth does not look like it took much effort to make. The low price however, is seductive. When presented with a truly fine piece of work, with a price tag that is an honest reflection of the skill, time and effort invested in it's creation, many people balk. The public at large just can't understand how a handmade product could cost as much, if not more than, a machine made product. In their Post Industrial minds a machine made product is far superior in quality to a handmade one. After all what good is it to have a handmade item if it doesn't "look" handmade. An education of both the public and the artist making the work seems needed. If the artist/artisan would make it a point of always striving to improve his/her quality then the public would hopefully learn to appreciate his/her work for what it is really worth.

I tried to fill what I perceived to be a gap. I wanted to produce high quality hand-made production ceramics. Thus, while the plates I produced were more expensive than your average functional pottery they were also far less than your one-of-a-kind art piece.

One of my goals in coming to graduate school was to find and develop my own personal style. I wanted this thesis to reflect my personal taste by looking a certain way. I was after a bold, graphic style. In essence, I wanted to produce graphic design on plate forms. Since I desired to focus on the plates' patterns I decided to make one plate form to use as a canvas for all the patterns. A porcelain clay body, with its white color and smooth fine texture, was the perfect choice to use for this canvas.
There are a number of different ways a ceramicist can apply decoration and pattern to a ceramic surface. I began looking for aspects of manufacturing that I could apply to a studio setting. In examining fine china available in stores, I discovered that today almost all major china manufacturers use silk-screened decals for their surface decoration. Ceramic decals were the perfect solution to my surface decoration needs for a number of reasons. One was their ease of use. They were simple and quick to apply, and the fact that they were printed in multiples meant that I could have the same image over and over again, which was perfect for production.

I also liked the idea of using decals because my previous experience with the silk-screening process told me that the decal printing process was well suited for producing the kinds of crisp, graphic images I was after.

Once I had settled on decals for my surface decoration, deciding upon a color scheme was easy. I went with the classic color combination of cobalt blue and gold for a number of reasons. One of course, is that I liked it. Another is its frequent use by many of the preeminent china manufacturers. Royal Worcester produces "Diplomat Fine Bone China" and Rosenthal makes "Cupola Fiorella Dinnerware". On a walk through the china department of a major New York City department store I discovered no less than seven major fine china manufacturers with some nine different cobalt blue and gold color patterns. This common color scheme must be very popular with consumers for so many companies to have some

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4Ibid., 22.
variation on the theme. There certainly was a historical precedent for the use of cobalt blue on a white plate. Turner of Worcester had designed the now famous, blue and white, "Willow" pattern by the end of the eighteenth century.\(^5\) I realized that by my using the same color scheme in my plates I would be producing a product that, though contemporary in design, would be familiar and comfortable to a consumer. By using the same color scheme on all of my patterns, I would make it possible to mix and match my plates with the products of other companies a customer might already possess. Additionally, there is how well my chosen color scheme works with food. Blue and gold on a white plate, goes well with, and visually enhances the appearance of most entrées, regardless of the foods color.

My desire to establish design parameters also had an impact on my decision to use blue and gold. As I stated earlier I was interested in setting up limits for myself to work within. By deciding ahead of time what colors I could use I was acting like my own client, outlining which and how many colors were to be used in the printing.

Finally there was the financial aspect of this thesis to consider. The opportunity, and my resulting decision, to have my decals printed at Heinrich Ceramic Decals, located in Worcester Massachusetts, meant an additional outside cost that had to be taken into account. Based on what I could afford I had to put restrictions on the number of different patterns and colors I could have printed. While it would have been less expensive for me to print them myself, Heinrich's superior printing equipment and quality control

made it possible for me consider designs as complex as the ones I eventually used. I made a conscious decision for quality instead of quantity.
I ultimately produced four different patterns in the blue and gold color scheme discussed earlier. Each of the patterns developed separately over a period of a few months. Two were executed by hand and two with the use of a computer. What follows is a description of each of the four designs, some of the thoughts behind them, and the techniques used in their execution.

"Squares"

"Squares" was the first design I produced (Figure 1). It consists of a 1"x1" blue square flanked on either side by two smaller 3/8"x3/8" blue squares. Drawn across the center square is a flowing squiggle in burnished gold. There are four of these groupings, one placed at each of the four compass headings of the plate.

Visually this is the simplest of the four designs in that it leaves much of the plate white. However there is a strength to this design that comes from its symmetry and serenity. There is also a slight Asian feel about the pattern resulting from the gold squiggle's subtle resemblance to Asian calligraphy. The squiggles play an important part in this design, since on each plate, each of the four squiggles is slightly different from the other. These small differences provide the plate with subtle and subconscious visual variety and movement.
Figure 1, “Squares”. Photograph by Bruce Rosenblum.
This pattern, "Squares" resulted as a direct evolution of my sketching process, starting with a very basic concept of lines grouped randomly together to produce patterns. As my sketches evolved the patterns became too random. I found that my eye wanted to find some kind of pattern to make sense of. I began grouping the lines together according to color or vertical/horizontal orientation, trying to create something that the eye could make logical sense out of. Eventually this became too static, and I found myself changing the shape of my lines into long triangular chopsticks of blue and short chopsticks of gold. From there the Asian reference of the chopsticks lead to the addition of the squiggle, and finally the long blue chopsticks got chopped down to the little squares seen in the final design.

In executing the final art work of this design for the decal manufacturer, I used both hand drawn elements and the computer. The squiggles were first drawn by hand then scanned into the computer. There they were transferred into Adobe Illustrator, a vector-based illustration program for the Macintosh Computer, where I had created the square elements of the design. Once in the computer I was able to position all the separate elements exactly where I wanted them, yet still keep them as separate items that could be printed individually according to color.

The fact that I could print each element separately was a crucial part of the silk-screening part of the decal process. Like silk-screening onto paper, each color gets its own run through the printer with its own stencil. In order for the design to work, registration of the new color must perfectly fit around the color that came before it.
When dealing with ceramic overglazes and gold luster, the registration must be absolutely precise because, according to Mr. Heinrich, my decal manufacturer, if the gold in any way overlaps the blue, where the two mix, the gold would end up bubbling and cracking when fired. By using a computer I was assured of perfect alignment. I was even able to add registration marks before printing directly onto a clear film that the decal manufacturer then used to make a photo stencil for silk-screening.

"Caribbean"

"Caribbean" is the second pattern I developed (Figure 2). It is made up of a series of blue undulating waves flowing around the plate's rim. Swimming within the waves are small golden fish. "Caribbean" is by far the most traditional pattern in feeling, even though the waves and fish are not rendered realistically. Rather, the waves are made up of long swollen "S" curves that taper at the ends. They fit together in such a way as to provide small negative spaces for the fish to swim within. What gives this plate its traditional feeling is the way the pattern completely encloses the plate. This physical closure to the pattern helps to give the user the sense of security that his food won't fall off his plate.

The pattern is executed in three equal sections that come together at three distinct points around the rim, but still give no sense as to where the water starts or ends. It is almost as if the curves and undulations were made up of snaking vines instead of waves, and the areas of gold could represent small flower buds instead of fish.
Figure 2, “Caribbean”. Photograph by Bruce Rosenblum.
"Caribbean" started with the idea of having the blue waves crashing against a golden beach. As the wave shapes developed they began to look more and more like fish or dolphins and it became harder to tell what was a wave and what was a fish. This led to the idea of actually distinguishing between the two by making the fish gold. Finally the golden beach disappeared completely and the sea, which until now had only wrapped a third of the way around the rim, grew to encircle the entire plate.

This design was one of two executed by hand. I painted the design full size using black and white Placka on heavy paper. Then I had it enlarged 200% at a photo copy store. On the enlargement I went over all the design's curves again, then had the corrected enlargement made into a Photostat, reducing it back down to the original size. After a few more retouches this Photostat was given to the decal manufacturer for printing. Because in this design the gold and blue never come in contact, no color separation needed to be done beforehand. It was then a simple matter for the printer to transfer my art work onto film then block out the unwanted areas by hand before printing each color.

"Fractured"

Visually, "Fractured" (Figure 3) is the most complex of all the designs, yet it started from a simple concept and was the easiest to execute. Like "Caribbean", "Fractured" completely encircles the rim of the plate. That, however, is where the similarity ends. This design is energetic and aggressive. It contains a wide blue area that is solid around the plate's outer edge but becomes broken and
Figure 3, “Fractured”. Photograph by Bruce Rosenblum.
random along its inner edge. A thin gold band follows this shattered edge, exaggerating the wild angles and points. There is no up or down to this design, right or left, beginning or end. It is varied and unique at each point along the circle, never repeating itself or hinting at some hidden pattern. It is like a mirror following the random rules of chaos when it shatters.

At its inception "Fractured" was set up as a computer exercise in positive and negative space. The idea was to create a design in which the positive and negative space flip-flopped back and forth in prominence. And as often happens out of an exercise, a strong design emerged. The interesting thing about this visually complex design is the fact that it was the easiest of all the patterns to execute. Like "Squares", it was done in Adobe Illustrator. The secret was the Randomize feature under the Filters heading. This filter took the curving pen path that I had created around the rim of my plate drawing and, using some mathematical formula known only to the computer software designer, it turned it into the wild jagged edge you see. Then I copied the computer-altered-path and reduced it in size by 3% to create a separate path for the inner gold line. Crop marks were added as a reference for the printer, then the path for the blue and the path for the gold were divided into two separate files. The actual art work was never printed on paper; rather, I brought the disk to the decal manufacturer and he used his computers to have the pattern output directly onto clear film. I did not see a full size pattern in print until the finished decal arrived with the others.
"Erosion"

The fourth pattern, "Erosion" (Figure 4), consists of an old weathered tree that wraps itself around the rim of half the plate. It looks to have been bent over by time and wind, with an area of gold wrapped around its roots. This is the only pattern that is deliberately open and asymmetrical. Even though the tree wraps itself rather expectedly half way around the rim, it is still most dramatic because it can be positioned off kilter, so that the tree seems to come out of a hillside and flow across the top.

This design went through the most changes. It started out as the idea of something precious trapped beneath a plain outer coating of white, so that if you were to wear away the outer layer you would expose a layer of blue underneath. If you wore away still farther you would then expose precious gold underneath. This was the most conceptual of all my proposed ideas; however, it also lent itself poorly to the decal process I was using for this project. The idea called for a physical change in the plate's surface, not just a cosmetic one. Such as a variation in the plate's surface texture, or possibly a subtle sculpting and contouring of the rim. Other ways of representing this idea of erosion needed to be found.

The old weathered tree was finally settled upon as an appropriate alternate image for this idea of wearing away. Here the idea of erosion is expressed by the leafless old tree that has been eroded by time, scoured smooth to its inner core. In the area of the tree that would be hidden beneath the earth's surface, the gold around the roots represents the water and other nutrients trapped in the ground that once gave it life.
Figure 4, “Erosion”. Photograph by Bruce Rosenblum.
Like the pattern "Caribbean", this design was painted by hand, enlarged, refined, and then reduced back to its finished size. Unlike "Caribbean", the area around the roots required that a second drawing, for the gold, had to be fit exactly around the first. This was done with a reverse Photostat of the root area. Then, after I outlined the area around the roots that I wanted with white Plaka, the two images of the tree were given to the decal manufacturer for printing.
CHAPTER 3

HOW

In this third chapter I will describe, from beginning to end, (sans designing the decals) the procedures involved in the production of the dinner plates.

My chosen process, jiggering, required a rotating plaster mold and a template attached to a stationary jiggering arm. The jiggering arm was lowered over the turning mold forming a plate out of a layer of clay that was sandwiched between the template and the mold. Before jiggering of the plates could begin a pottery wheel had to be properly set up for jiggering. First, the jiggering arm was carefully positioned over the center of the wheel and then bolted into place. Two standard bat pins were then placed in the wheelhead and held in place with wing nuts. Next, a 12" particle board bat with pre-drilled holes for the bat pins was used to create a base, or "...jigger chuck..."^6, for the plate molds to follow.

The first step in making the jigger chuck was to drill small holes part way through the bat in a random grid pattern. Nails were then hammered into the holes and some thin wire was wrapped around the nail head like a bad version of string art. The wire covered bat was placed on the wheel head and a cottle, or tube made from a wide strip of vinyl flooring, was placed around it and held in

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position with a chain comprised of some large rubber bands. Into this was poured wet plaster that was prepared in the usual way. (Appendix 1)

Enough prepared plaster was poured into the cottle to produce a short cylinder approximately 13" in diameter by 5" in height. The plaster was allowed to start setting up. When the plaster was firm enough to hold its own shape but still soft enough to easily carve, the vinyl cottle was removed and the plaster was shaped with metal trimming tools. The shaping had to be done quickly before the plaster became too hard to work. First, the sides of the disk were carved to make the disk centered on the bat. Then the top of the disk was trimmed until it was smooth and level. Then a 3" diameter hole about 1" deep was carved into the center of the disk and two small rectangular tabs were carved into the edge of the hole to form a center key. (When the subsequent plate molds were poured directly over this base mold the key acted as a quick locking system that allowed me to rotate molds quickly and easily.) After drying, the base mold was sponged with three coats of mold soap in preparation for the next step in the process: creating the plaster molds for the plates.

To make the plate molds, a template of the underside of the plate had to be created. For this, finished scale drawings were needed. I drew a top view and a cross section of the plate. I then enlarged the drawing by 12% to account for the shrinkage of my clay body. Then using the cross section drawing of the plate, I traced the profile of the underside of the plate onto a piece of 1/4" thick Plexiglas™. The Plexiglas™ measured approximately 8"x7" with two
parallel 1/2"x3" slits cut onto it. The plate profile was roughly cut out of the Plexiglas™ with a bandsaw, then a disc sander was used to put a 45° angle on the edge. Files were used to finish shaping and fine tune the edge. Once completed, the template was bolted into place in the jiggering arm with the angled edge of the template facing out towards me, parallel to the wheel head. The template was set so that when the arm was lowered to a pre-set stop the template edge would be at the desired height.

The jigger chuck was placed on the wheel and a large sponge was used to apply three thin coats of watered down mold soap. Soft clay was then added around the key mold to enlarge the overall diameter of the wheelhead to 14 1/2". I then placed the vinyl cottle around the enlarged clay and plaster mold and once again held it in place with the rubber band chain while I poured in a freshly mixed up batch of plaster. Unlike the first batch of plaster, this batch was mixed up according to much more exacting standards that took in to account the height and width of the area to be filled and a proper water to plaster ratio of 65:100.(Appendix 2)

As soon as the plaster was set up enough to hold its own shape, the consistency of sour cream, I carefully removed the cottle and began working it by scooping out a few handfuls of plaster from the center. Then the wheel was turned on and while rotating at a slow speed the jiggering arm with the template was lowered into the plaster. As the template scraped up globs of plaster I removed them to keep the template's edge clean while it roughed out the shape of the mold. As the plaster hardened I sped up the wheel and increased the downward force of the jiggering arm until it reached
the pre-set stop and no more plaster was scraped up by the template as the wheel turned. The goal was to produce a mold with a smooth, even surface so that when the clay was pressed against its surface the clay came away without any extraneous marks that would have to be sanded away later.

As soon as I finished shaping the mold, while the plaster was still hot from setting up, I removed both molds from the wheel and immediately separated the molds from each other by gently tapping a screwdriver between the two. Now the base mold was free to be used again for pouring the next plate mold on top of it. I poured a total of five plate molds and ended up with two that I felt where smooth and crisp enough to be used in this thesis production run. The finished molds were allowed to dry thoroughly while I prepared the face template.

The face template is what is used to actually form the clay plate against the mold. The face template was made the same way as the underside template, except that the 45° bevel was faced in, away from me, so that it could compress the soft clay downward onto itself while turning instead of scraping the clay up like the template that's used for the plaster. To position the template, the jiggering arm was lowered to the pre-set stop, and the base mold with the plate mold was set in place. The template was then bolted to the jiggering arm. It was positioned parallel to the wheel head so that both the outside edges of the plate's mold and template lined up with each other. Finally I left a space of just over 1/4" between the bottom edge of the template and the mold to provide for the desired thickness of the plate itself.
With the dried molds in place and the Plexiglas™ template in position, I was ready to begin jiggering my dinner plates. A five to six pound ball of my soft porcelain clay body (Appendix 3) was wedged up, then run through a slab roller set at 5/8". Next, a metal rib was used to smooth one side of the slab and remove any texture left by the canvas used in the slab roller. This smoothing step was very important because even with the pressure of jiggering, the side of the slab that was laid against the mold would still retain the nubbly texture of the canvas.

After the slab had set up for a few minutes, I gently lifted the slab off the canvas and laid it smooth side down on the mold. Using my hands I compressed the slab into the mold, forcing it down into the foot ring area of the mold. If this step was not done sufficiently, when the plate was removed from the mold the underside would not be properly formed. After trimming any of the excess clay so that the slab was flush with the mold's edge I was ready to jigger a plate.

With the wheel turning at a medium speed, and plenty of water as lubricant, I gently brought the jiggering arm down in contact with the clay to form the plate. As the template scraped up excess clay, frequent stops to clean the template off with a sponge and water were necessary. When the jiggering arm hit the pre-set stop and no more clay collected on the template as the wheel turned the plate was done. A needle tool was used to clean up the plate's edge and the plate mold was lifted off the wheel to allow the newly formed plate to firm up. (After all the prep work the actual jiggering of a plate only took about 15 minutes.) Depending on how saturated the mold was from previous plates, and how dry the air in the studio,
the plate would be ready to unmold in as little as an hour and as long as two and a half hours. When the edge of the plate had pulled away from the mold and it was firm enough to hold its own shape, I flipped the plate onto a bat to dry. Drying had to be done slowly, face down, to help prevent warping.

Once dry, I used a sanding stick on the surfaces of the plate to remove any blemishes or imperfections as well as smooth and round the edge of the plate. The plate, along with 39 others, was now ready to be loaded in to the kiln for a first firing. I bisqued the plates to cone 04 (Appendix 4) since I found that at a lower bisque temperature this particular clay body tended to be a little on the chalky side.

After bisquing all the plates were sanded again with a fine grit sanding sponge, thoroughly rinsed with water, then dusted off with an air hose to remove any last traces of dust or dirt. Finally, some watered down wax resist was carefully applied to the foot ring of the plate with a small sponge. I now had a perfectly-smooth clean plate ready for glazing.

I used a translucent white glaze with a smooth satiny gloss finish. The glaze is a dry bulk glaze sold by Miller Ceramics. It comes in powder form ready to go, all you need to do is add water and mix. I worked in batches of 15 pounds of glaze to which I alternated adding water and mixing with a Jiffy mixer. When I had a nice creamy consistency I ran the mixture through an 80 mesh screen to remove any remaining lumps.

For the glaze application I chose to use the air gun. The air gun allowed me to apply a smooth even coat of glaze without any of the
runs, drips or thick overlap marks that are more common with the dipping or pouring techniques of glaze application.

The application process was easy but slow. First I half filled the spray gun's paint reservoir with glaze. Then using a Hydrometer to read viscosity I added water to the glaze till I had a reading of 1400, the level of viscosity recommended by Miller Ceramics. Using this watered down glaze mixture I sprayed the underside of the plates first. Spraying the underside first made it easier for me to handle the plates while I cleaned the glaze off the foot ring with a sponge. The wax resist applied earlier prevented the glaze from sticking to the foot ring, making this extremely important step a lot easier; without it the plate would fuse to the kiln shelf in the firing. Once the underside had dried to the touch I turned the plate over and coated the top. After glazing, the plates were loaded into a kiln and fired to cone 6. (Appendix 5)

Once the glaze firing was completed I now had a stack of smooth, off-white plates ready for the final steps: applying and firing-on the overglaze ceramic decal. The following application process was suggested to me over the phone by Bud Heinrich, of Heinrich Ceramic Decals, the manufacturer of my decals. First, I placed the plates in a kiln and heated them up to 90°F. A warm plate, according to the manufacturer, is more receptive to the decal. Meanwhile I took a large container of distilled water and using an aquarium heater I heated the water up to 85°F. The distilled water was recommended because ordinary tap water may contain unwanted minerals that could result in an unattractive haze over the decal when fired. The aquarium heater was suggested as a good way
of keeping the water at the correct temperature during the application process. A decal dipped in warm water, then slid on to a warm plate, is much more flexible and willing to conform to the plate's surface than a cold one.

Once the water and the plates were warm I removed a plate from the kiln and thoroughly wiped the surface with alcohol to remove any traces of dirt or oil that could prevent the decal from sticking. Then I placed a decal in the water to soften. When the decal had begun to come away from its backing I took it out of the water and slid it on to the plate. After positioning the decal on the plate I then took a small rubber squeegee, provided by the manufacturer, and gently rubbed it over the surface, removing excess water and trapped air from under the decal and smoothing it into place. When smoothing the decal down, it is very important to remove even the tiniest trace of an air bubble that may be trapped underneath. Wherever the decal is not in direct contact with the plate it will burn off in the firing and leave a hole in the design.

Once the decal was in place the plate was put back into a kiln, set at 130°F, to dry overnight before firing. This, according to Mr. Heinrich, is the optimum temperature to use because it is warm enough to keep the decal soft and pliable while it dries; thus allowing the decal to relax and stretch itself over any small imperfections in the plate's surface. This produces a tighter seal between the decal and the plate. In addition, 130°F is far enough below the boiling point so that while the decal dries it allows the remaining water molecules, trapped under the decal, to evaporate out slowly, without turning to steam and causing a rupture in the decal.
The next day the plates were fired, for the third and final time, to 1460°F as recommended by the manufacturer. (Appendix 6) After cooling the next step was to burnish the gold areas of the decal with a small, stiff, fiberglass brush provided by the manufacturer. This final step brought out the soft luster in the gold of the decal's design.

I now had a finished product. After eliminating plates that did not meet up to my quality standards and allowing for the plates that did not make it though the three firings, I had an attrition rate of a little over 50%. While a loss rate of 50% is unacceptable for a long term production run, it is however quite reasonable for a prototype run. At each stage of the process I lost a few pieces; then made corrections to solve the problem. I have no doubt that if I were to do another production run of forty plates I would have a much higher success rate. Probably in the area of 85 to 90%.

There were a few negative aspects to the project that should be addressed. One was that the Plexiglas™ template was not hard enough, and failed to keep a crisp edge throughout the production run. For a longer run a template cut out of aluminum would be preferable. Secondly, the translucent white glaze that I used allowed small, dark, foreign particles in my clay body to show through. I either needed to use a more opaque glaze not something I wanted to do since I liked the smooth semi-satin quality of the glaze or I needed to find a cleaner clay source.

One of the more frustrating aspect of the project was the warping of the plates. The jiggering process allowed me the freedom to design and create a plate form that had a beautiful wide rim on which to place my designs. However, this wide rim was heavy and
easily distorted. Any mishandling of a plate before it had completely
dried could result in a subtle rise or dip in the rim that would
become more pronounced with each firing. I compensated for this
problem as much as possible but there were limits to how much
control was feasible in this small studio.

That, however, was one of the reasons for this thesis project to
begin with: To adapt manufacturing techniques to a small studio.
My goal was to adapt not copy. The R.I.T. studio is not a factory. To
me the very essence of adapting implies that you have limits within
which you must work. That is part of the challenge. What I am
saying should not be misinterpreted as apathy or resignation. I have
complete confidence that with more time for experimentation I could
have satisfactorily resolved the warping problem.
CONCLUSION

In the end I had over twenty plates that turned out beautifully. I feel that overall the project was a complete success. The production techniques of jiggering and ceramic decals adapted easily to the studio environment and allowed for greater consistency and productivity than I could have achieved by throwing each plate separately on a pottery wheel.

The plates themselves work well as plates, with a big eating surface and slightly angled rim to rest your knife on. They stack neatly and the glaze surface is hard and stain resistant.

Visually the patterns turned out just as I wanted them to; strong, bold and unique. The plates look good hanging vertically on a wall; however, in truth, it is when placed on a table that their beauty comes through the most. Whether grouped together in multiples of the same pattern, as in a traditional place setting; or, all four patterns mixed together in a trendy eclectic mix, the plates make for an elegant, contemporary table setting.

One of the most unique, and in some ways, amusing thing about doing this thesis was talking to people to find out which pattern was their favorite and everyone had an opinion. This was no great surprise. I knew from the beginning that choosing a china pattern was all about one's own personal taste. Everyone's taste is different, that's why so many different patterns are made. It may be a cliché
but there is truth to the saying: "You can't please everyone all the time". So, rather than be upset when someone didn't like the "Caribbean" pattern, I took pleasure in the fact that they thought the "Fractured" pattern was intense and unusual.

Eating is a very basic activity. Even in today's fast paced world of the twentieth century; and, as stated by Jeremy Myerson and Sylvia Katz at the beginning of this thesis, it is true that everyone needs basic items to eat from. To design something so universally needed was an irresistible challenge. For me, the goal was to design something that was not only functional, but aesthetically pleasing as well; to add an additional dimension to the diner's experience. I was fascinated and invigorated by the challenge, and I can understand and appreciate what it is about tableware that has attracted so many great artists and designers. I am inspired by their company and am pleased that I have successfully brought my contribution to the table.
APPENDIX 1
PREPARING PLASTER

When preparing plaster for a mold the easiest and most common way to proceed is with the good old fashioned mountain method passed on from potter to potter. I used United States Gypsum Company Pottery Plaster #1 for all my molds.

First you take a bucket and fill it with water. Then take your plaster and quickly, but gently, sift it into the water. Always add the plaster to the water, not the water to the plaster. As you sift the plaster will be absorbed by the water and settle to the bottom of the bucket piling up into a little mountain. Eventually you will reach a point when the water can no longer absorb any more plaster, at this point stop and let the plaster/water rest or slake for three minutes. Letting the plaster slake is an important step in that it allows the plaster time to become fully saturated with the water which helps prevent dry clump when mixing.

After the three minute slake thoroughly mix the plaster and water together. You can use either your hand or a power mixer of some kind, I used my hand. Either way you want to mix from the bottom of the bucket so as to prevent the formation of air bubbles in the plaster. Once you have a smooth creamy consistency the wet plaster should be poured slowly and gently, so as to prevent more air bubbles, into a prepared cottle.
This mountain method is quick and easy but very inconsistent. Because you are basically eyeballing everything, from the water to the amount of plaster, you have no way to accurately repeat the process with the same ratio of water to plaster. Which means that each mold you make will have a different density and absorption rate.

This mountain method seems to produce a very hard mold with a low absorption rate. This was fine for the base mold, since I wanted a mold that was hard and could take a lot abuse.
APPENDIX 2
WATER TO PLASTER RATIO

For my plates I wanted molds that were strong enough to take the pressures of jiggering but still absorbent enough to allow a plate to set up in a reasonable time. I also felt it was important for all the molds to be identical in porosity so that the set up rates were the same no matter which mold I happened to use. To do this I needed to be much more accurate with my water to plaster ratio. I accomplished this by weighing out the water and plaster for each batch I mixed. I used a water to plaster ratio, or consistency, of 65:100. I then performed the following calculations to determine how many pounds of water and plaster I should use for each batch.

\[ v = \pi r^2 h \]
\[ v = \pi \times r^2 \times h \]
\[ v = \pi \times (8)^2 \times 3 \]
\[ v = \pi \times 64 \times 3 \]
\[ v = \pi \times 192 \]
\[ v = 3.14 \times 192 \]
\[ v = 602.88 \]

# Quart's for Water = 602.88 \div 80 = 7.536

# Quart's x 2 (1 Quart of Water = 2lbs.)
$$7.536 \times 2 = 15.072\text{lbs. of Water}$$

$$15.072(\text{water}) + .65 (\text{plaster}) = 23.18792\text{lbs. (plaster)}$$

After rounding off I used 23lbs. of plaster and 15lbs. of water for each batch of plaster I mixed up.
For my clay body I started with the following cone 6 formula:

Baron Porcelainous Fineclay

50% clay, 50% nonclay materials

Six Tile kaolin 22%
Velvacast 2.2
Ball clay 6
Potash feldspar 2.6
Flint 1.6
Frit 90 of 3124 8
Macaloid 1.0
Bentonite 0.57

I then made minor adjustments to accommodate the materials available and my personal needs. The formula I used was as follows:

Grolleg 2.2
EPK 2.2
XX Sager 6
Custer 2.6
Flint 1.6
Frit 4

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APPENDIX 4

BISQUE FIRING

There was nothing unique about my bisque firing. It was a standard cone 04 firing in an electric kiln. I simply loaded up the kiln with my plates, face up with no stacking of one on top of the other. I did not stack the plates because I wanted to minimize stress on the plates rims to help prevent warping. I made up a cone pack with an 05 and an 04 cone and placed in front of the kiln's peep hole. Then I candled the kiln over night with the door slightly open and the bottom element turned on. The next morning I shut the door then turned on the next element an hour later. An hour after that, if the kiln had a third element, I would turn it on as well. Hours later, when the 04 cone dropped half way, I shut the kiln off and let it cool over night before unloading.
APPENDIX 5
GLAZE FIRING

For the cone 6 glaze firing I either did a standard firing, following the same procedures as the bisque firing (but to a higher temperature), or I used the programming feature on the Unique kiln and used the following program:

1:00 to 180° F
Hold 2:00
3:00 to 500° F
Hold 0:10
3:00 to 900° F
Hold 0:10
2:00 to 1,000° F
Hold 0:10
5:30 to 2,100° F
Hold/Soak 0:30   End Program

During the final thirty minutes of soak time I watched the cones through the peep hole. When the 6 cone dropped half way I turned off the elements and allowed the kiln to cool over night before unloading.
The third and final firing was the decal firing. For the decal firing I always used the Unique kiln for its programming ability and pyrometer that allowed me to know the temperature in the kiln.

There were a number of key procedures in the decal firing that greatly differed from the standard firing. To begin with, the door of the kiln was left ajar one to three inches during the firing, up to 900° F, for needed ventilation of the organic material in the decal as it burned off. After reaching 900° F the door was shut for the remainder of the firing.

Another key difference in decal firing was the fact that I did not use any cones to determine when I had reached temperature. Upon discussing the firing schedule with the decal manufacturer the use of cones was established to be unnecessary. What was needed, according to Mr. Heinrich, was a final temperature of 1460° F held for 20 minutes.

After firing the kiln was allowed to cool overnight, plus an additional twenty-four hours, before unloading. I found that the Unique kilns were so well insulated that after the standard overnight cool down the internal temperature of the kiln still was just under 400° F. While it is not unusual to crack a kiln door at this point to quicken the cooling process, I found that the cool stream of
air that rushed in the opened door put too much stress on my plates; and, some of them cracked from thermal shock. By waiting an additional day before unloading, until the internal temperature of the kiln read between 110° F to 140° F, I eliminated the cracking problem completely.

For all the decal firings I used the following program:

1:00 to 190° F
Hold 2:00
3:30 to 850° F
Hold 0:15
2:00 to 1460° F
Hold 0:20  End Program
SELECTED BIBLIOGRAPHY


