Master of Fine Arts Thesis

Curiosity Jumps: Adding Up the Layers
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Abstract

My passion for ceramics was inspired by a wide range of possibilities on forms and surfaces to incorporate new ideas and fabrication techniques. The MFA Program at Alfred University has led me through the processes of pressure casting, 3D printing, extruding, laser machine etching, glass casting, and silkscreen ceramic decals. Exploring new experiences with materials and methods has guided my creativity toward multiple directions. My work includes tableware, jewelry, and furniture and, pursues ideas in objects with awareness of practical applications and aesthetic values. The primary objective in my MFA thesis was research for new potential in forms and surfaces to create an original result by combining the following: 1) traditional hand crafts + the use of machinery, 2) ceramics + other disciplines, and 3) cultural and technical perspectives in ceramics from the United States and Japan.

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Introduction

The transition from Japan to the United States in my mid-teens seeded my curiosity in art as a new method for exploring, expressing, and communicating. Since then, I explored several art media including drawing, painting, printmaking, sculpture, and design. My interest in art and design expanded over time as I constantly searched for connections across various subjects. My passion for ceramics was established on this foundation, and a wide range of possibilities for ceramic forms and surfaces to incorporate new ideas and techniques. The MFA Program at Alfred University has led me through the processes of pressure casting, 3D printing, extruding, laser machine etching, glass casting, and silkscreen ceramic decals. Exploring new experiences with techniques and methods has guided my creativity through multiple directions and combining these applications has added multiple layers of visual representation in my work.

My work is concerned with the question of how to live, finding my own values and creating happiness through making objects that are useful in daily life. Applied art is a form of creating and pursing ideas in objects with awareness of practical applications and aesthetic choices. My work includes tableware, jewelry, and furniture that can be used as tools in daily life to positively impact one's lifestyle. With my previous undergraduate studies in ceramics at the Kansas City Art Institute in the United States and later in the technical training program at Saga Ceramic Research Center in Japan, the primary objective in my MFA thesis was research for new potential in forms and surfaces to create an original result by combining the following: 1) traditional hand crafts + the use of machinery, 2) ceramics + other disciplines, and 3) cultural and technical perspectives in ceramics from the United States and Japan. Combining ideas and experiences from opposite perspectives, my curiosity jumps from one point to another, connecting the dots to become lines/curves and providing designs for my work.

The symbol "十" is a Japanese character indicating the number ten, which consists of opposite lines (vertical and horizontal) that form a perpendicular cross. It is similar to a geometric cross, which has been broadly used over time in various cultures in religious, medical, and mathematical contexts. In Japanese, this character is also used as a prefix to denote meanings, such as (feeling fulfilled), [十分: *jū bun*], or (being perfect and complete) [十全*: jūzen*]. These concepts, "fulfilled," "perfection," and "completion," are some of the keywords that have challenged and motivated me in my studio practice during the MFA Program at Alfred University.

+ Vase

My design process and workflow often begin with digital drawings on 3D computer software, Rhinoceros. On digital drawings everything exists as points, and when they're connected, these points will become a line and a curve. My body of work during my time at Alfred University began and was developed from a single curve. The curve was repeated to become a wave pattern and rearranged by utilizing the tools of "copy," "mirror," and "offset," on the computer software.[1] While I was exploring different methods and ideas, a new approach to extrusion and a new design structure for a flower vase were developed at the same time. This flower vase consists of a cross shape located in the center of an eight-sided wall. The repeated wave curves of the perimeter provided textural qualities when the clay was extruded. Part of my intention in the beginning, with inserting a cross, was having an interior structure to prevent the

[1] Rhinoceros 6

form from collapsing while being extruded, and simultaneously to add visual characteristics in the design.

Choosing a method for constructing a work sets parameters for size and volume while negotiating with accessible tools and equipment. It also requires certain material specifications that can be utilized with the equipment. These choices in the design and material lead to different aesthetics and functions in the resulting forms. In order to extrude my drawn design in clay, the first step was to make an extrusion die. Considering the design details, and allowance for the size of the bits fabricating ¼" thick steel, using the CNC machine at the machine shop, this project proceeded with making the die for the horizontal extrusion machine. This pug-mill style extrusion has greater power for extruding intricate designs. Whereas the vertical extrusion machine can easily switch to any clay body, this horizontal extrusion machine primarily uses red tile clay, some of which is left within the machine. All these specifications in material, accessible equipment, and design aesthetics combined to create a chain reaction and influence the process and outcome.

The terra cotta extruded pieces present a bold and rough appearance with a combination of both physical and visual weight. By actually seeing the form as the material was being extruded with my design structure, the thickness of the clay required by the extrusion process focused my attention on the proportions of the piece. The physical and visual attributes of this piece resulting in overall size, volume, and texture, caused me to think more about the interactions within an installation space and other materials and objects. For example, the earthy and architectural feeling combined with the weight and durability of an extruded terra cotta piece was suggested to me that the object should be placed closer to the ground on a hard floor instead of placing it on a tabletop or other furniture made of natural material. The form that I had

originally imagined as flower vase did not translate with this material and method. Instead, my mind suggested this was a form that could function as a holder for something much bolder, perhaps a blooming tree branch, creating a sense of balance between the ceramic piece and other arranged elements.

The extrusion method also presented multiple opportunities for exploring different ideas. The extruder only pushes the material forward and the resulting shape remains—an open structure. While seeing this piece as a utilitarian vase, a bottom needed to be attached and the form closed so that it could hold objects and liquid. The post firing process of using a ceramic tile saw was also necessary. The parts of extruded clay that were curled and deformed were sliced off with the saw in order to attach a flat tile on the bottom with glaze. Working with clay constantly challenges my ego and also opens new possibilities by showing me paths in multiple directions. While aiming for the results expected from my digital drawings, many unexpected outcomes appeared during the process. My mind wandered and thoughts flowed. These ideas became several iterations of sculptures, wall tile paintings, and a tile stacked table. All of these had potential in their own way and have been stored as visual memories from physical experiences which may return for future projects.

While reacting to the physical and visual attributes from the vase experience with extrusion, my next approach to this form was to slip cast it in porcelain. The process of slip casting in porcelain seemed to provide a more desirable approach with greater potential for outcomes suited to my original vision of flower vases for the interior décor. Compared to the extrusion method, slip casting provided important details of scale, volume, texture, and color. In order to use the same design for the slip casting technique, the image had to be sliced into four separate parts. This process began with digital drawings on Rhinoceros, 3D printing prototypes,

creating multiple plaster molds from the prototypes, slip casting in porcelain, then attaching four separate parts into one.

Physical and chemical interactions with materials is a journey for problem solving and a file for emotional records. The gravity pulls down the weight of the material and causes it to slump and warp. It is different from digital drawings which can perfectly extrude the shape of a design, precisely straight and beautifully create clean lines in a few seconds. Such emotional waves of frustration, anger, patience, and joy are unique to the physical interactions with materials during the making process. These may manifest in the spirit of the object. These qualities cannot be obtained through the use of machinery alone. On the other hand, the machinery can help to achieve aesthetics in the design. My goal is to create aesthetically and emotionally pleasing objects through collaboration between hands and machinery, which will provide a positive impact to individual lives.

Materials and methods are form of transportations while on a journey of finding a way to get to my destinations. How and why I chose materials and techniques established a passageway to my creative goals. Accomplishing this goal means getting closer to my ideal form—what I had seen in my imagination. These visions were consciously and subconsciously constructed in my mind connecting ideas from the past experiences and inspirations. These intangible visions became more clear through the process of physical interaction with materials. Every new experience in the work process involves problem solving, and often new ideas and opportunities come and go along the journey. Paying attention to the events that occurred during the process is an important aspect of the journey, but keeping my focus on the destination toward ideal forms kept me moving forward; otherwise, it becomes easy to get lost in multiple ideas.

The cross-shaped vase created through the process of slip cast porcelain provides four separate openings that can each support flowers and contributes opportunities to arrange the flowers in unique ways. Since each of the four parts was casted in a separate mold and then attached together into one, this process also provided greater possibilities for exploring colors. The base of white porcelain can be adjusted into any colors by adding different stains (ceramic pigment) into the casting slip. This can be a single color in different hues and saturations or colors can be combined to create marbling effects. Incorporating colors brings attention to various expressions, feelings and energies. These colored forms may become another foundation for the surface decorations by adding up multiple layers with colors, textures, and patterns through various applications. By incorporating various ceramic materials such as underglazes, glazes, china paints, and lusters, and applying various methods such as painting, spraying, sandblasting, screen printing, and laser etching, I searched through many layers for the potential in visual representations.

Working with surfaces is somewhat similar to putting clothing on the body. Exploring many layers through colors, textures, and patterns may bring associations with different seasons and cultures. Connecting the form of the cross-shaped vase which has four separate openings with this awareness of the seasons could provide function and aesthetic for a single flower vase to be used in each of the seasons. Bringing distinct aesthetics in each decorative surface, different interactions could be observed between a range of flowers throughout the year.

+ring

Boundaries of subjective and objective values with regards to making items for individuals is an important aspect. A Swedish designer and potter, Ingegerd Råman, said that for

every product she produced over the many decades of her career, she considered herself as her first customer.[2] Personally, I like this approach. Considering myself as a starting point, I attempt to evaluate each piece based on such considerations as safety, comfort, aesthetics, and durability. While following my subjective interest in making jewelry in porcelain, I have developed two different forms of porcelain rings: 1) a simplified shape from the previous vase, and 2) a decagon shape. Pursuing quality in such a tiny item, I have gone through a variety of materials and methods experiencing many trials and errors. This was a process of finding a process. While I was working on the prototypes for the porcelain rings and figuring out a way to create plaster molds for casting in porcelain, I made several iterations using a variety of materials and methods. Starting with 3D printed models, hand carving plaster, lasercut plexiglass, and cast silicon rubber, each material and method brought its own advantages and disadvantages in the process in terms of speed, precision, modification, and the ability to release the prototype from the plaster mold. Working with this tiny scale made it difficult to achieve precision by only using digital tools available to me, as these tools caused to deformation in these small objects. I realized that manually modifying the process with patience using my hands and checking precision by sight, is as significant to the process as using other tools to obtain quality in making such small objects.

Jewelry is an aesthetic element selected by and placed on the user's body. As a decoration it speaks of personal style, from an internal and an external perspective. I'm interested in creating these items for individuals with consideration of the user's aesthetic values and pursuing these aesthetics values through the abundant variety of unique qualities in ceramic materials. Porcelain, colored porcelain, various clay bodies, glazing, decals, luster, atmospheric firing, and so on, provide endless and exciting potential in the application of ceramics to

[2] IKEA Sverige, "IKEA I samarbete med Ingegerd Råman"

fashionable items. And, I hope that this variety of applications translates into objective values which inspire others to find their own personal taste.

They are still waves

Since the beginning of my MFA at Alfred University, I have been captivated by wave patterns and have incorporated them into my work. My reflection on why I pursue the wave theme stems from my own cultural connections. The repetitive, systematic, and geometric patterns of the Japanese traditional "blue sea wave" are symbolic of waves of water and are used extensively in Japanese culture, appearing in many applied arts, including textiles, papers, lacquer wares, and ceramic wares. In Arita, Saga Prefecture, Japan where I studied production porcelain for two years, this pattern has been incorporated in ceramic wares through four centuries. During my studies in the technical training program at Saga Ceramics Research Center, this pattern was used as practice for improving skills with line drawings and coloring techniques in cobalt underglazing, with a specific type of brush that is unique to Arita. I physically engaged with this pattern daily for many hours over many months without giving much thought to the process. My pursuit of this wave theme during my MFA Program stemmed from my physical interaction and memories processed through my hands and eyes.

Incorporating the elements of the wave pattern into a series of small items, such as ones for food, flowers, and interior displays, became one focus of my studio work toward the thesis. A dimensional wave pattern creates the foot of multiple functional pieces and is embedded within the form itself, rather than applied on the surface as two-dimensional decoration. Waves, being symbolic of movements, and the porcelain body, with a wave foot, reacted by creating movement and distortion within the firing process. Kiln firing shrinks the original shape through

the process of vitrification and can distort or warp. It seemed contradictory, however for my goal was to keep the form stable (still) without distortion during the firing process. These forms are displayed on a wooden tray that also incorporated a three-dimensional wave pattern on the surface, and each porcelain item can be captured by the wave on the bottom. This interaction of the wooden tray and the objects through the wave pattern became an important compositional element in this series. When the objects are placed on the tray, it establishes the ability to interlock and interchange the arrangement of multiple pieces on the tray.

In Japanese culture the tray is commonly used as a tool for serving, carrying, and displaying. Traditionally, Japanese meals are served in a set of bowls and multiple dishes. Since many pieces can be put on a tray together, they can be carried to a place easily. Serving food dishes on a tray is commonly seen at traditional formal restaurants. By creating the interaction between the tray and porcelain pieces through the wave pattern, it helps to secure the placement of objects on the tray while carrying them. This also add both aesthetic and sensual characteristics to the dining experience. The physical proportion and size of all items in this series is petite. The amount of food that dishes can contain is limited, causing attention to be focused on the presentation of the individual servings. These small items also require attention to carefully return, hold, place a dish back on the tray. This attention may be experienced as a momentary feeling of fulfillment, gratitude, and togetherness. My future ambition is to explore collaborations between my work and chefs where similar values can be shared.

Pressure Casting

With my previous experiences in Arita, I learned a pressure casting method. The process requires a pressure tank and is often used in industrial settings. Manufactured items such as

tableware are produced by injecting ceramic casting slip under pressure into plaster molds. My interest in making work with pressure casting methods continued in the MFA Program; my goal was to build a studio-scale pressure casting machine. While manufacturing companies tend to focus on efficiency producing quantities and qualities with a larger scale equipment, a small studio-scale machine has flexibility to experiment with different applications of materials, ideas, and structures.

Compared to many forming methods in ceramics, pressure casting can attain precise and intricate design details. It creates items in a solid and consistent form molding from both the top and bottom plaster molds. The tableware set that I've worked on with consideration to the details of size, form, thickness, and curves, brings both the utilitarian aspects, and the aesthetic values into a strong relationship. The tableware set that I have created has four sizes of plates and four sizes of bowls (240 mm, 200 mm, 160 mm, 120 mm). The proportions of the plates were designed for the flexibility of using the items in multiple ways, in this case as plates, or as lids for bowls. The dimensions, curves, and angles are precisely measured in order them to stack multiple pieces sturdily for both purposes. These details in accuracy are unique qualities obtained by pressure casting method. The height and shape of the bowls vary with each size in diameter offering a variety of practical use for serving and storing.

The utilitarian aspects in this design process are based on my conscious decisions made from my experiences and interactions with kitchen items and utensils. The observations were made by questioning how small changes could make a large difference in these items and increase their usefulness in the current culture. Working with the details of design within a range of products has its own subtle beauty. For example, a blank white shirt can be varied in the quality of the material, or in the design and making process. The difference between the mass-

produced items and designers items can often be observed by the material and design qualities which become apparent in visual and sensual experience when the piece is worn. The quality of design products appears in its overall design aesthetic; however, numerous discoveries can also be made during its use by the user. A white porcelain tableware is somewhat similar with this idea that objects are offering visual and physical experiences through interaction with the user and other serving items. As I was working in production pottery in Arita where utilitarian wares were often produced with the same source of material (Amakusa porcelain), I realized that it takes more time to appreciate and notice the differences in the design and aesthetics especially when the series of items represents minimalistic design. The size, proportion, texture, curve, and color are all important aspects to both the utilitarian and aesthetic perspectives in the design products. Yet these characteristics can be recognized only through direct experience in use. Thus, one of the potential benefits of using a studio-scale pressure casting machine was to create sample items, experience the usage, and to modify the design as needed to fulfill utilitarian functions before committing to the production of a larger number in factory. In this long process of defining and refining the items to be produced, my desire was to create pieces that are of high quality and that will last and be appreciated for a long time.

Material + Culture

While giving focus to making individual objects in my current studio practice, each object also creates interactions among various elements in the space. From Japanese culture, tatami mats are a traditional flooring made of woven rice straw. This was the foundation of the indoor space in traditional Japanese home. Tatami was developed because of an abundance of rice straw in the culture and the use of this material influenced the Japanese way of life. Japanese

furniture was designed to interact with tatami. For example, tables and other necessary furniture items inside the house were made with lightweight and smooth materials, such as wood, bamboo, paper, and textiles. With consideration toward preserving the tatami, tables were made with short legs and thus people sat directly on the tatami mats without using chairs. These material resources defined their culture based on how the material was to be properly used and the interaction among different objects. Time and space are fluid, however. Objects are always subject to change with the changing times and spaces that interact with their surroundings. Today we have access to a wide range of materials. And, tradition and culture are constantly adapted from the influences of many cultures from around the world. The furniture that I have designed toward my thesis represents the material of tatami embedded in a wooden display table with tall legs. This table was designed to display some of my works, such as an incense burner and flower vase placed on the wooden tray. While I have currently adapted physically to living with western styled furniture, the texture, smell, color, and pattern that are unique to the tatami mats trigger phycological and emotional connections of comfort, calmness, and nostalgia. By combining the two cultural perspectives from my experience in living in both the United States and Japan, I attempt to create a positive impact on daily life through the physical and emotional aspects encompassed in utilitarian and aesthetic objects.

Collaboration

While I enjoy learning and gaining broad experiences in various technical skills and knowledge of materials in my own studio practices, I also have an interest in working as a designer and collaborating with manufactures. During my time in the MFA Program, I have collaborated on a tableware piece with a manufacturing company in Arita, Japan. Founded on

centuries of porcelain production in Arita, the porcelain tableware and other functional objects produced by this factory exhibit accuracy and precision. Their knowledge of materials, craftsmanship, technological equipment, and the firing processes are developed by passing on their skills from generation to generation. While studio practice allows me the flexibility and freedom to experiment in various ideas and design structures, collaborating with this factory provided a high level of quality and solutions to the technical challenges in the process which I could not have achieved alone.

A serving bowl in the form of a UFO began with the concept of transcending time and space. Throughout this process, the digital drawings and renderings which were created on the 3D computer software were shared digitally with the factory and the factory produced the piece. My intention was to bring this piece from Arita, Japan to Alfred, New York traveling through time and space, and to have conversations about materials, technical skills, and cultural perspectives. Whether having this item produced as a final product or at least one step closer to being a final product, new questions are always awaiting. Besides collaborating with a factory, I also hoped to collaborate with restaurant chefs who can add their interpretations and experiences to the serving bowl. These connections and interactions between different regions of ceramic culture, including studio to industry, and ceramics to other disciplines, continuously inspire new potential in the search for ideas.

Statement

Balance is an essential concept in my life. Transitioning from Japan to the United States in my mid-teens seeded my curiosity in art as a new method for exploring, expressing, and communicating. Since then, I explored several art media and my interest in art and design expanded over time as I constantly searched for connections across various subjects. An aspect of working with ceramic material that brings particular interest to me is its duality. I seek to combine the aesthetics in the ceramic objects and its utilitarian functions.

My work is concerned with the question of how to live, finding my own cultural values and creating happiness through making objects that are useful in current culture. My work includes tableware, jewelry, and furniture that can be used as tools in daily life to positively impact one's lifestyle. By combining traditional hand skills and the use of machinery, I create various prototypes, plaster molds, and samples in ceramic material. The size, proportions, texture, curve, weight, and colors are all important aspects to both utilitarian and aesthetic properties in the design process. Through this repetitive process of research in materials, techniques, and designs, I seek to discover both practical and theoretical designs with consideration toward usefulness, uniqueness, and longevity.

Bibliography

IKEA Sverige, “IKEA I samarbete med Ingegerd Råman,” Feb. 12, 2016, 1:59, https://youtu.be/Lk5ELCkHH90

David Gelb, Chef’s Table

The Pyramid Code- TV Series, 2009

The INTP- Dr. A.J. Drenth

Japanese Decorative Arts

Catching the big fish- David Lynch

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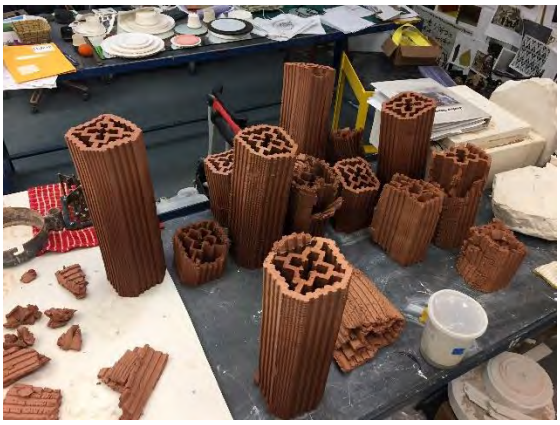
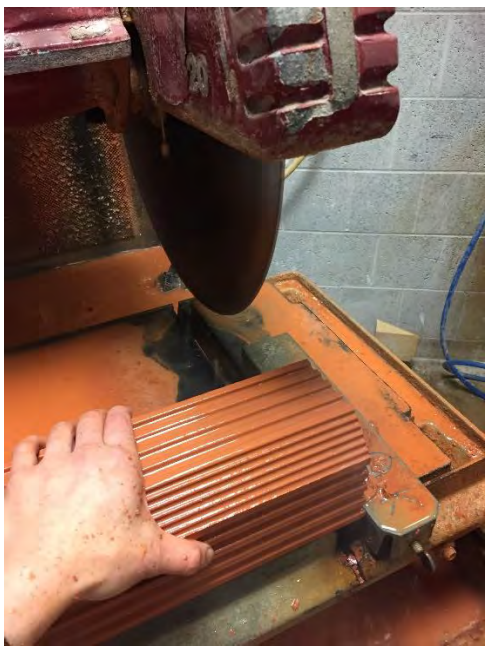
Wa: the essence of Japanese Design

Ikikata- Kazuo Inamori

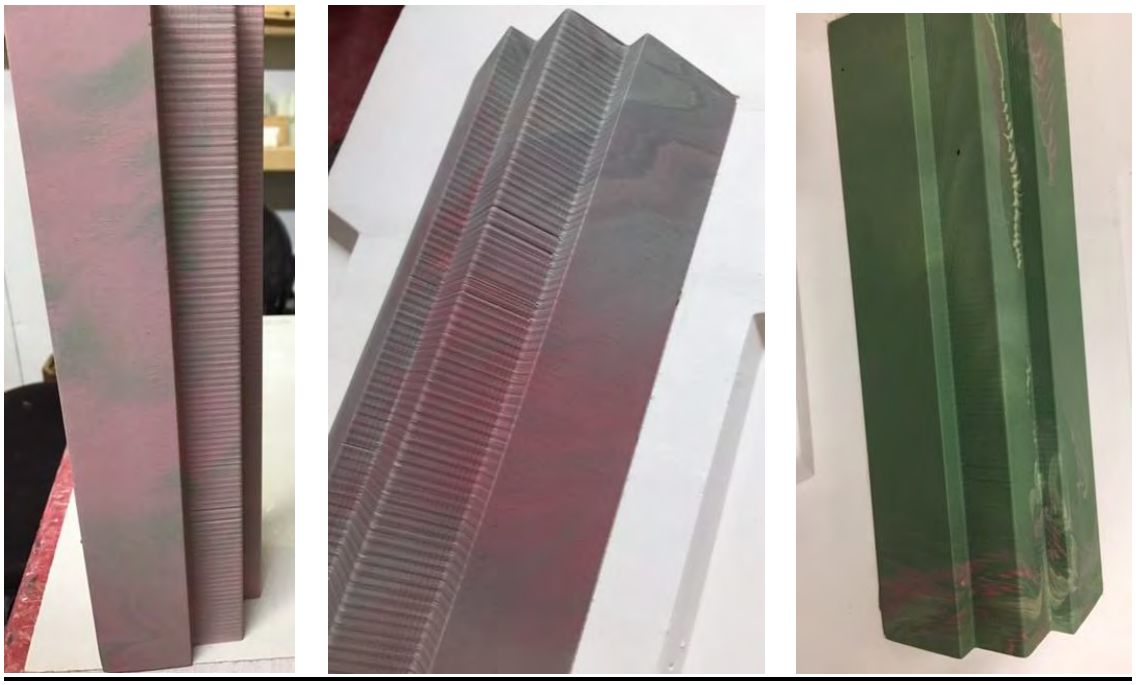
Images

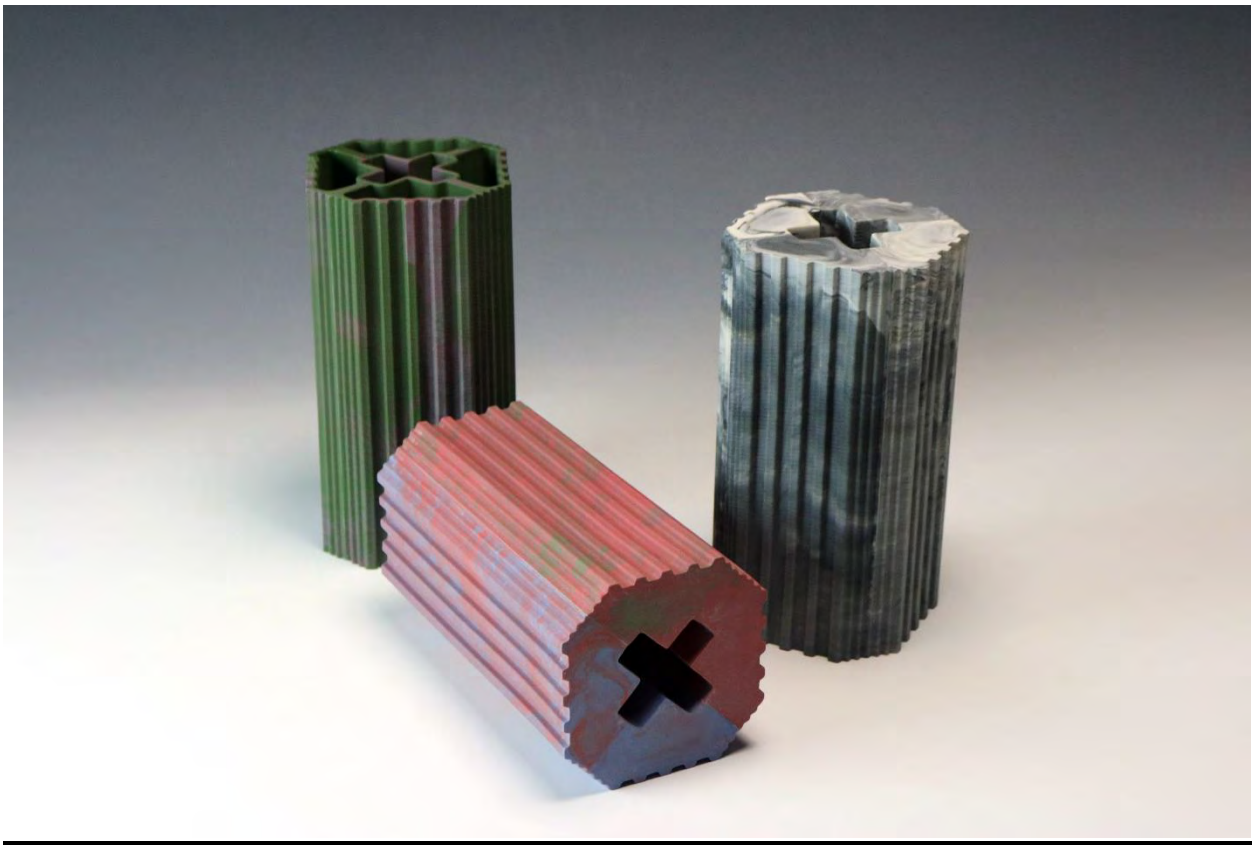
- **Extrusion**





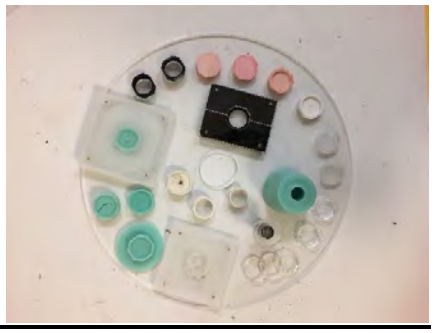
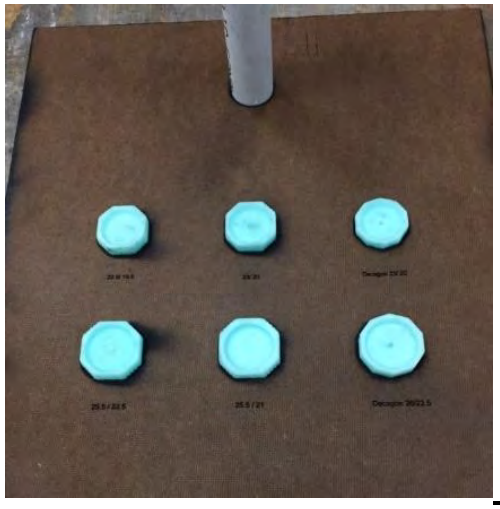
- **Slip Cast**

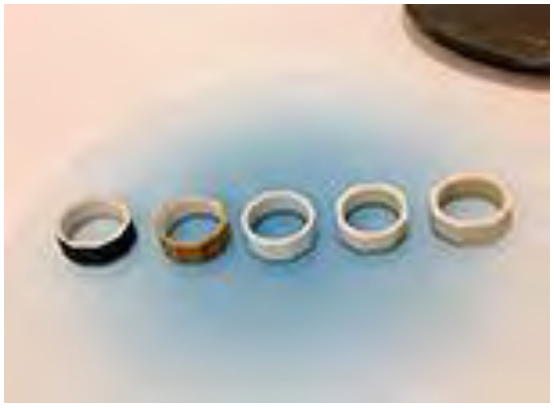




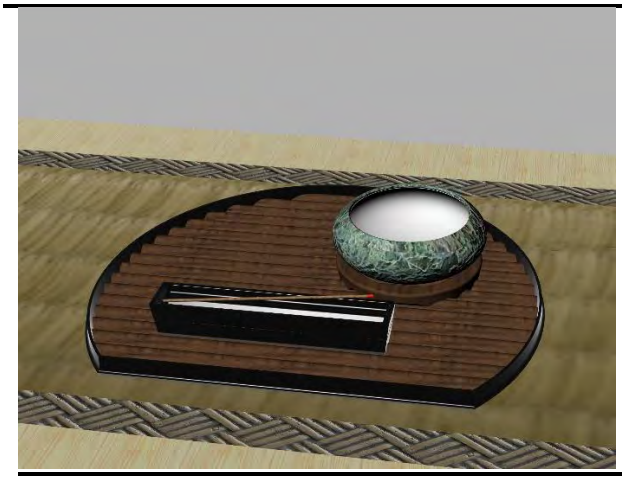
- **Porcelain rings**






- **They Are Still Waves**



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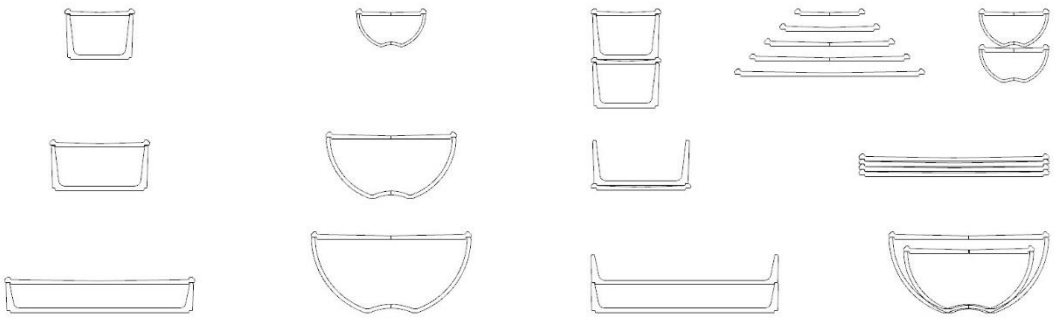
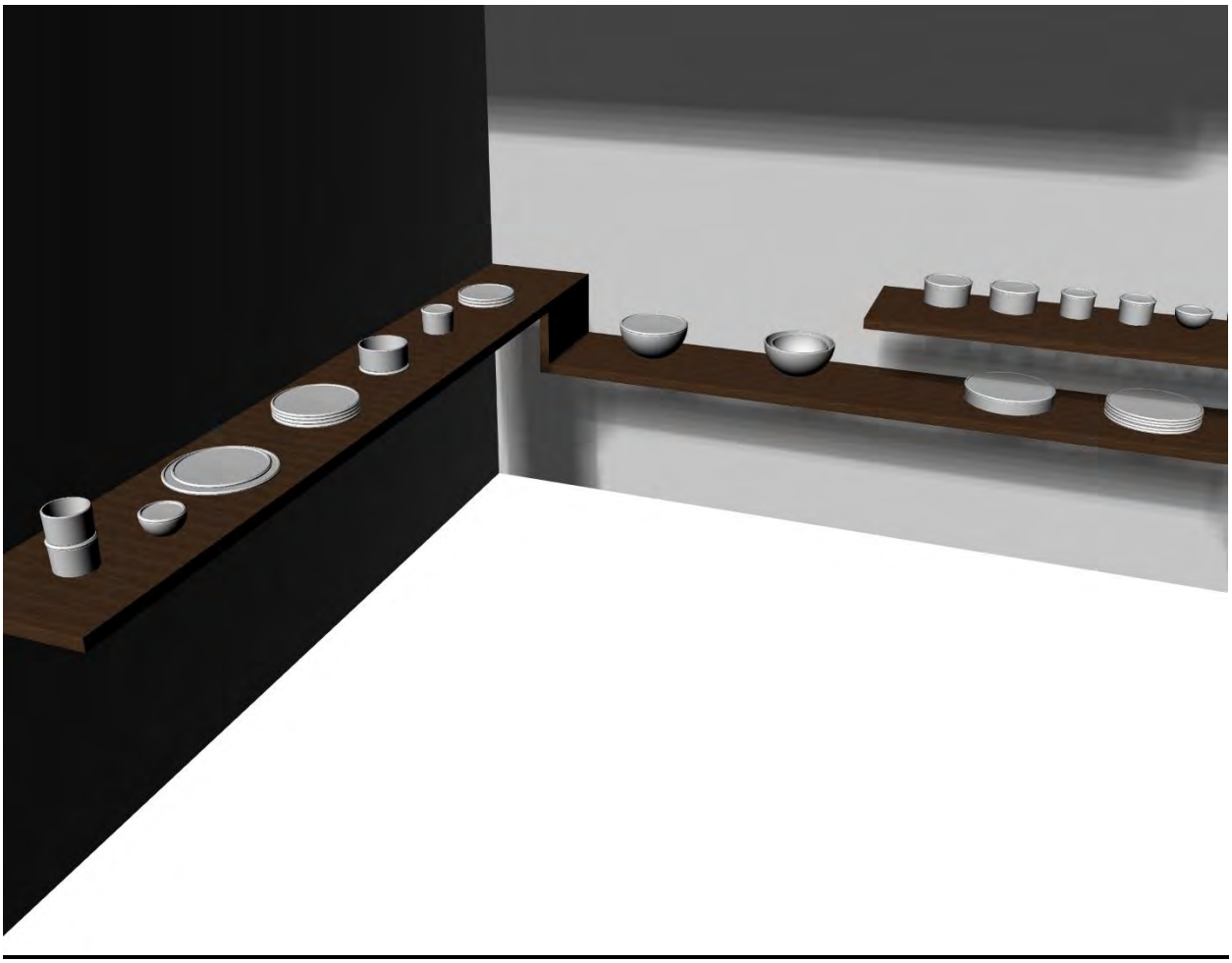
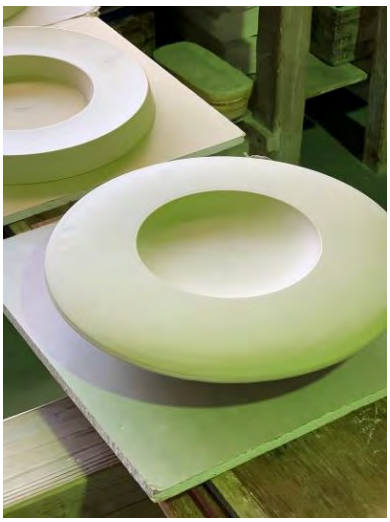
- **Pressure Casting**





- **Material + Culture**

- **UFO Bowl Collaboration**



Technical Statement

Porcelain Body Recipe ^10

- Favorable workability when mixing, casting, and releasing from the plaster mold.
- Simply cool white at ^10 reduction and warm white at ^10 oxidation. A very strong porcelain body with a subtle shine and a smooth comfortable touch after sanding.

		5 Gal. Bucket (40lb dry)
Grolleg	50%	20 lb
Silica	25%	10 lb
Mahavir Feldspar	25%	10 lb
Darvan 7	0.36-0.4%	65-72 ml
Water	35% Ideally use 1-2% less water for pressure casting	14 lb
Shrinkage: 12-13% Specific gravity: 1.8 Material cost: $17~ (5 gal.bucket)		
Mixing: Prepare 14lb of water in the 5 gal. bucket then add half of deflocculant. Add half of dry materials into the bucket then mix in the shar. Gradually keep adding the rest of dry and deflocculant in turns while paying attention to the consistency and continue mixing in the shar for about 30 mins. Sieve twice through 80 mesh.		
Firing: Normally bisque to ^010 then often clean edges/surface with 200- 600grid wet/dry sandpaper before ^10. Electric: Fast Glaze to ^9 then add hold for 1hr at ^9. (^10 is down) Gas: Usually fire off 30-45mins after ^9 went down. ***Prefer to use flat new kiln shelves and alumina wash with food coloring***		

Plaster Mold:

- Different types of plaster for different purposes and their water ratio (personal preference) ***Cold water and hand mix 5- 8 mins***

Slip Casting Mold	Pottery plaster #1 Ratio: 68g water/ 100g plaster
Pressure Casting Mold	Pottery plaster #1 Ratio: 65g water/ 100g plaster
Plater Prototype	50/50% Pottery plaster #1+Hydrocal Ratio: 58g water/ 100g plaster
Mother Mold	Hydrocal Ratio: 45g water/ 100g plaster

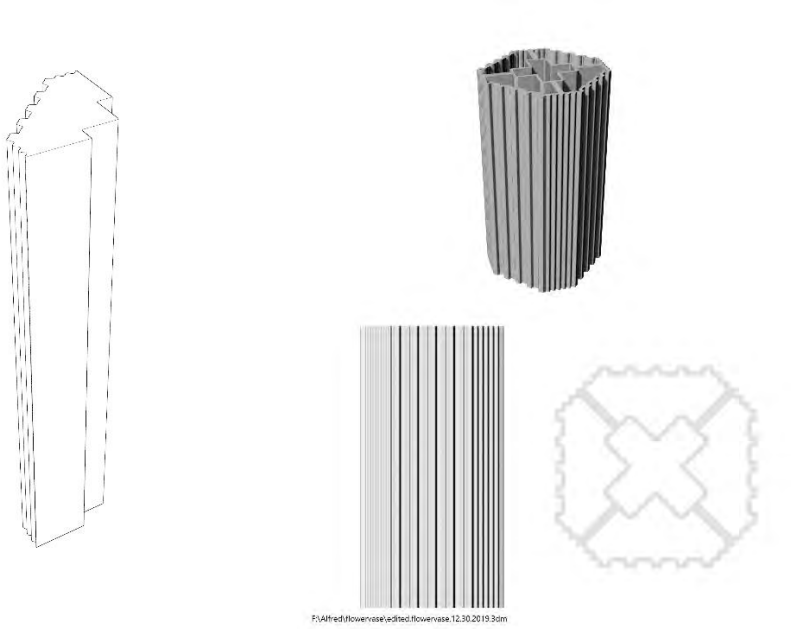
- **Thickness of mold:**

  25- 30mm from prototypes (slip casting)
  60- 80mm from prototypes (pressure casting)
  50- 60mm from plaster mold (mother mold)

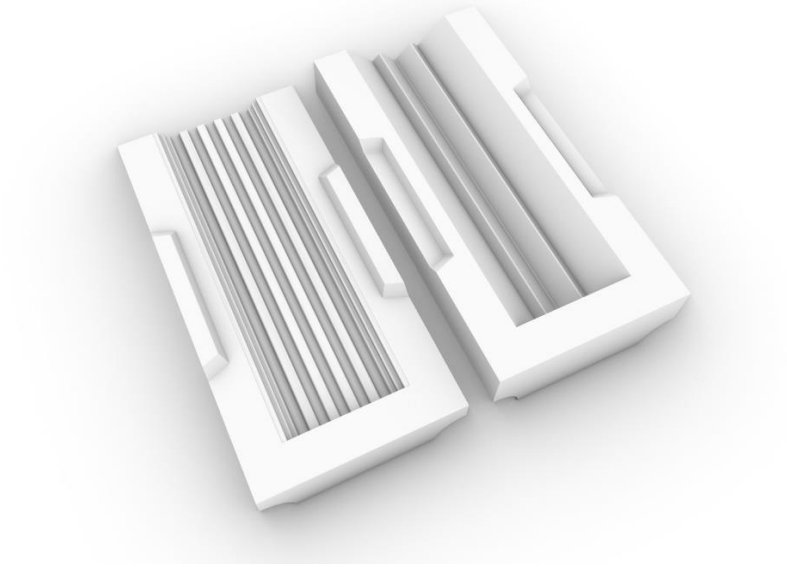
- **Calculation of plaster volume:**

  Pottery Plaster#1: radious x radious x height x 3.14
  Hydrocal Plaster: radious x radious x height x 3.14 x 1.3

Slip Casting



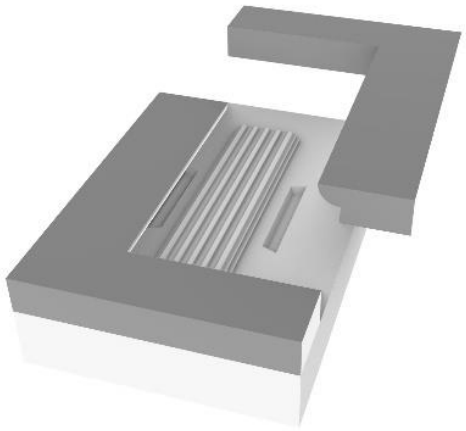
Rhinoceros 6
3D printer LulzBot TAZ Workhourse/ LulzBot TAZ5
3D printer information at https://www.lulzbot.com/
To prepare the stl file for 3d printing: https://www.lulzbot.com/cura

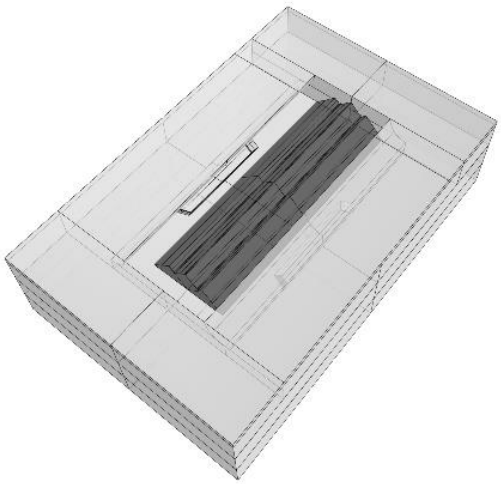


- The video of creating this vase can be found at https://youtu.be/CKe7y44cT4Q
- The 3D model in STL file of keys for creating plaster molds is included in the CD disk.

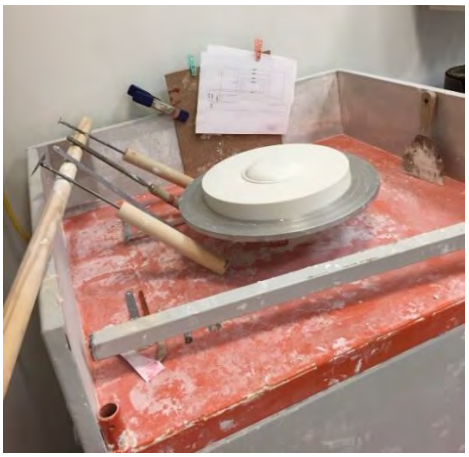
Mother Mold

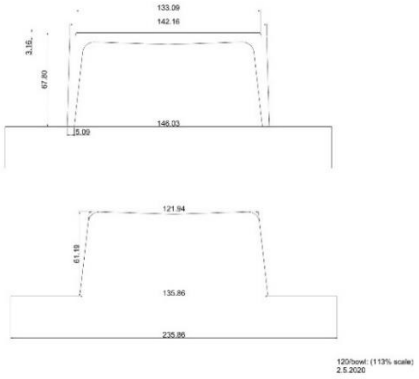
The purpose of mother mold is to duplicate the casting molds. Since my previous vase structure required multiple casting molds that needed to be produced at the same time to create a single piece, I used this method. Below is a set of mother molds in Hydrocal Plaster which I used for this vase, and molded from the original two-part mold (see image on the previous page).

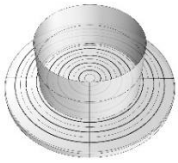


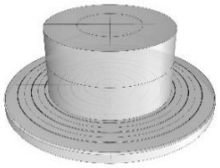


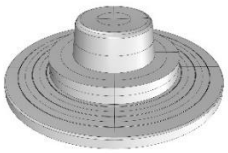
Plaster prototype using plaster wheel

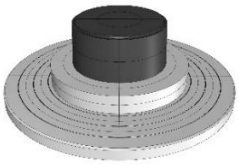












1. Place the plastic on the wheel.
2. Calculate the amount of plaster needed and fill the form with plaster. Let this sit for approx. 5 minutes, until no fingerprint to the surface of plaster when pressing with a finger. The plaster is very soft at this point and is time to carve away as much as possible to get roughly close to the measurements. As the plaster sets more firm, continue to refine the prototype in more detail.
3. Once the interior form has been curved from the plaster block, apply mold release soap multiple times.
4. Put the plastic form again on the carved plaster and seal with clay around the outside. Mix and fill the space with the plaster between the interior mold and the plastic. (I use 50/50 Hydrocal and pottery #1 plaster mix for my prototype because of the strength when later making mold and workability when carving plaster.)
5. Carve the exterior shape of the prototype.
6. Remove it from the interior form and go forward with the pressure casting mold making process.

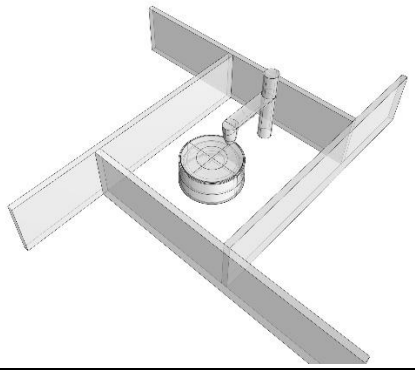
Pressure Casting Mold

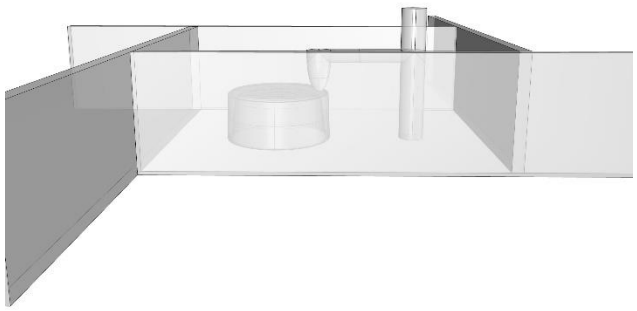
The prototype that was made on the plaster wheel is now placed on the flat surface table to make a two-part pressure casting mold. (See images on the previous page.)

The finished mold will have walls that are approximately 50 mm – 60 mm thick from the prototype and a channel for the slip to pass into the mold. When the mold is completed there will be a channel from the lower half of the mold to the upper half of the mold. Under pressure, the slip will fill the cavity created from the prototype. The channel is created using a length of plastic pipe.

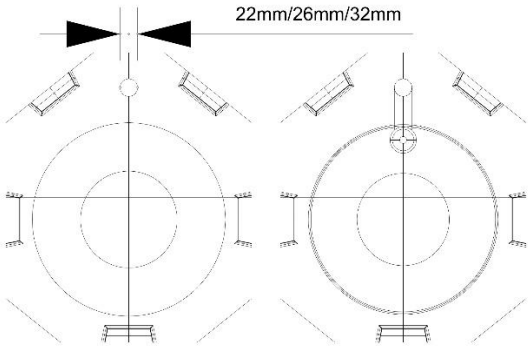
The pipe needs to be placed about 30 mm away from the prototype and secured before pouring the plaster. The size of the pipe varies depending on the size and thickness of the prototype. Most of my work was created using a 22 mm pipe. If the prototype is larger than 200 mm in diameter, a 26 mm pipe is required.

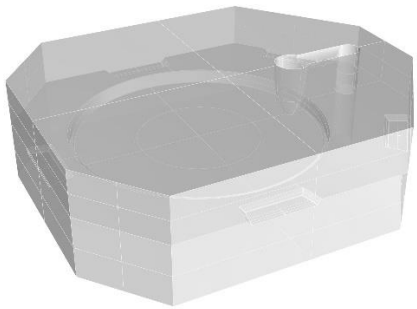
*Thoroughly apply mold release soap multiple times before pouring the plaster to create the mold.



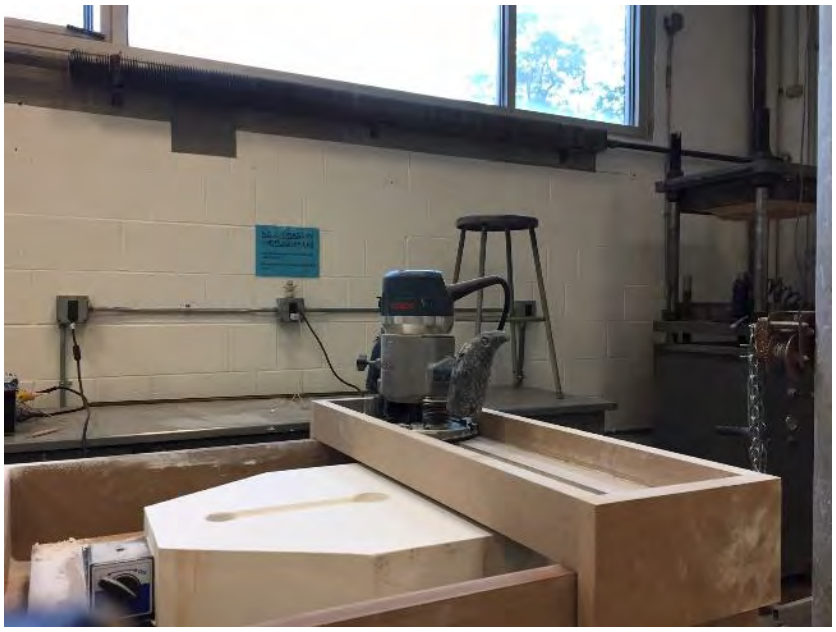


The completed the two-part mold will be similar to this, and the top and bottom of the mold must be flat and smooth.





This picture shows a process used to flatten the outer surfaces of the mold. If these surfaces is not flat, the slip will leak while pressure of casting.



Air release mold for deep bowls:

Pressure Casting Machine

The initial research and technical advice was gathered from this company in Takeo City Saga Prefecture in Japan. Website: http://moriweld.com/


Pressure casting machines for pottery industries made by this company.

This is pressure tank that I used in my practice. The idea was to explore the possibility of using a pressurized spray paint tank to develop into a small scale pressure casting machine for ceramic use.

Pressure Tank: C.A. Technologies- 5 Gallon Air Agitated Bottom Outlet Pressure Tank (Product Information: http://www.spraycat.com/51-[513-514-515].pdf)

Part No. 51- 514 is the item purchased for this ceramic pressure casting
The 4 main options to consider for pressure tank:

- Stainless Steel or non stainless steel
- Sizes: 2.5 gallon, 5 gallon, 10 gallon
- Regulator: 1 or 2
- Agitator: (This can purchase separately and attach it later if desirable.)

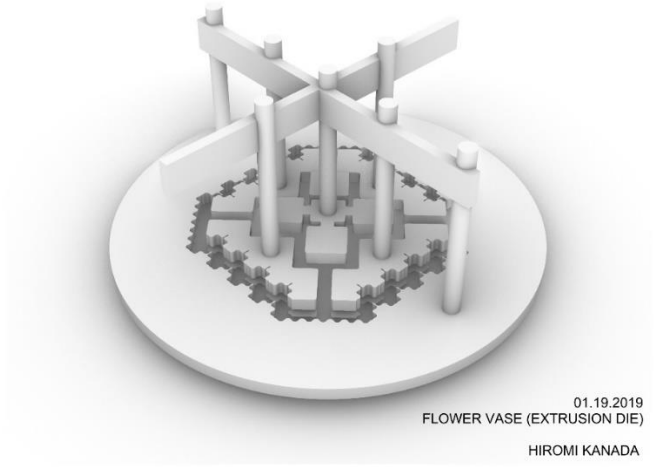
Casting Table

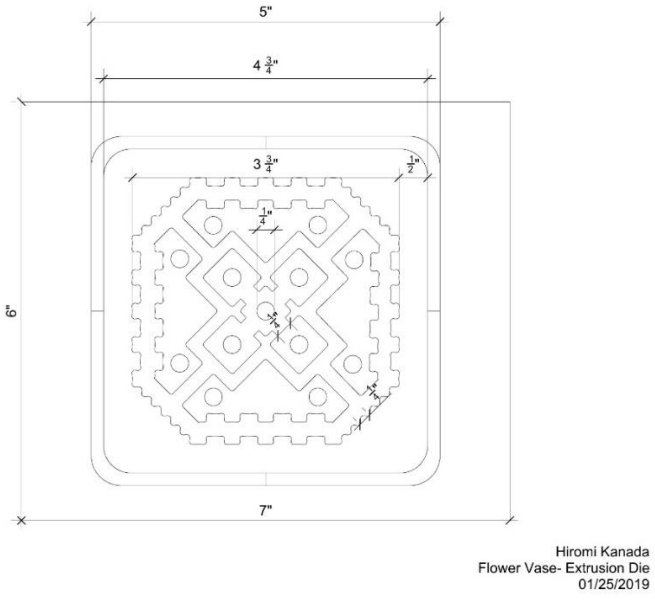
This is an image of the casting table designed by Keith Simpson. This project could not have been completed without his technical support. Thanks to his many ideas and his collaboration with technicians at the machine shop this equipment was vital to my work.

Casting time: 10- 20 minutes
Pressure in psi: 15- 25 psi

Extrusion

There are vertical and horizontal extrusion machines. The vertical extrusion is flexible permitting the choice of different clay bodies. The length of clay that these machines can extrude at one time without stopping is less for the vertical machine than for the horizontal extrusion machine. The horizontal extrusion machine primarily uses red clay and some of it is retained within the machine. The horizontal machine has greater pressure and vacuum power, and it can extrude a greater length with more control to prevent warping. The maximum size for the design of the extrusion die for the horizontal machine is also bigger than the vertical one. To make a new extrusion die, contact the Machine Shop. The design file for the CNC fabrication was saved in dxf and Parasolid format.





Silkscreen Decal

Studio elective in print making

The waterside decal using silk screen can be explored various approaches to underglazing, inglazing, and overglazing decals in various colors, patterns, texts, and more. Create an image and save as Tiff file to make screen screen in the print making department.

Silk Screen can purchased at victory factory: https://www.victoryfactory.com/
Decal Medium and cover coat can purchased at schillinginc: https://www.schillinginc.com/inks-coatings.aspx

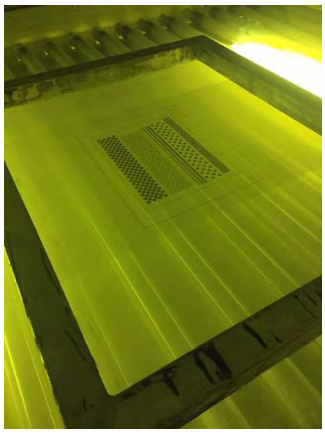
Indirect (Waterslide Decal) Screen Printing Mediums

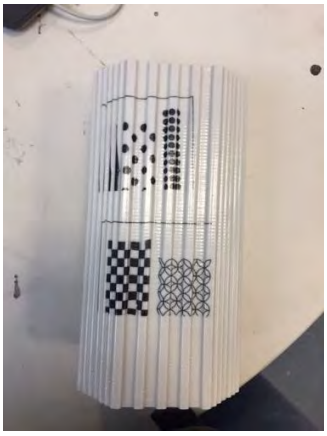
Product#	Product Name	Description	Mixing Ratio**	Flash Point
4700MB*	Decal Medium	Excellent medium for hand or automatic decal production. Dries quickly, burns out cleanly and has the ability to hold a large amount of color.	67% Powder 33% Oil	118°F
4701MB*	Decal Covercoat (Use with 4700MB)	Clean burnout and great flexibility for application on odd shaped surfaces makes this system exceptional. This clear lacquer coating should be screened through a 70 mesh/inch screen over the entire decoration.		116°F
4702MB*	Yellow Decal Covercoat (Use with 4700MB)	Has the same characteristics as 4701MB, but yellow in color.		116°F
M2600*	Decal Medium	Excellent medium for hand or automatic decal production. Dries quickly, burns out cleanly and has the ability to hold a large amount of color.	67% Powder 33% Oil	118°F
C2601*	Decal Covercoat (Use with M2600)	Clean burnout and great flexibility for application on odd shaped surfaces makes this system exceptional. This clear lacquer coating should be screened through a 70 mesh/inch screen over the entire decoration.		116°F
C2602*	Yellow Decal Covercoat (Use with M2600)	Has the same characteristics as C2601, but yellow in color.		116°F

* Indicates product that has to be shipped "Hazardous Material". Additional shipping charged will apply. Cannot ship via air service.
** This suggested mixing ration is by weight not volume.

Decal Medium 4700MB and Decal Covercoat 4702MB are recommended products for studio use from this company. There is minimum $100 for placing an order.

The mixing ratio can be up to 80% Powder and 20% oil.
The medium and covercoat is oil base. To clean the screen, use lacquer Thinner or mineral spirit.





Glass Casting

Studio elective in glass

The mold was made with a 50% silica and 50% plaster ratio using the island method. The mold needs to be completely dried in the hot box before proceeding to the kiln firing. The fine powder frit was filled in one side of the mold, extending approximately ¼ inch above the mold. (Measuring the amount of the powdered frit on weight scale is helpful for comparing some of the testing results). Place the opposite side of the mold on top of the other and place the mold on the kiln shelf. Place bricks on top of the mold to add equal amount of weight. The end result for this casting was that the amount of firt, and the kiln firing schedule seemed to work well. However, the mold resulted cracking, which affected the outcome of glass casted piece. In the future, I'd further explore different ratios for silica, plaster, and water to make a stronger mold.



Press Molding Firing Schedule
Go to "Profile Action", click "Name Profile" and "View/Edit Steps"
1. Ramp time- 12 hours to 660F
2. Soak- 12 hours at 660F
3. Ramp time- 6 hours to 1650F
4. Soak- 3 hours at 1650F
5. Ramp time- 1 min to 1000F
6. Ramp time- 30 min to 960F
7. Soak- 3 hours at 960F
8. Ramp time- 3 hours to 700F
9. Ramp time- 2 hours to 500F
10. Ramp time- 1 hour to 40F
***Add last step: "End Action Loop 1-Hold"