Abstract

Combining Ceramics and Metalwork to Explore the Relationships Between the Industrial and Humanistic Elements of the Modern World

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April 2010

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This written report supports the creative thesis entitled "Combining Ceramics and Metalwork to Explore the Relationships Between Humanistic and Industrial Elements of the Modern World." In recent history the spread of industrial technologies into the world has grown exponentially. In this thesis the intermingling of human nature and industry is explored through process and material use of ceramics and metal.

COMBINING CERAMICS AND METALWORK TO EXPLORE THE RELATIONSHIP BETWEEN THE INDUSTRIAL AND HUMANISTIC ELEMENTS OF THE MODERN WORLD

A Report of a Creative Thesis

Presented To

The faculty of the School of Art and Design

East Carolina University

In Partial Fulfillment

of the Requirements for the Degree

Masters of Fine Art

by

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April, 2010

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INTRODUCTION

During my time in graduate school I have investigated material and process. The combination of ceramics with metals is particularly of interest to me because of the remarkable contrast created by the fragility of ceramics against the rigid property of the metal. The juxtaposition of the two different physical properties holds a relationship I consider to be similar to the one humans have with many aspects of the industrial world.

A great inspiration for creating my work is the influence that modern technological advances have on the natural structure and instinct that is found within life on earth. The techniques in this thesis work are traditional, but through exploration and experimentation they have evolved to generate creative work that illustrates a relationship between materials as well as interactions I perceive between humans and industry. They are referenced when used and can be found in the Appendix section of this report.

MATERIAL MATTERS

Clay and metal elements are both incorporated into industrial practices in the modern world. Ceramic can be hardened to a point of immense strength and used as a very precise cutting instrument, or incorporated into industrial machinery as an efficient insulator against high heat. Metal can be reduced to a brittle wafer thin gauge and incorporated into the most intricate and delicate technologies.

Although the two materials break away from their physical norms in today's advanced world, for the purpose of this thesis they will remain in the stereotypical view that is usually associated with them. That view is that as materials, clay is very impressionable and fragile, and metal is rather rigid and unbreakable.

In this body of work I use ceramic to represent humanistic elements because of its physical ability to translate my touch so quickly and truthfully. The impressionable quality that can display my own fingerprint shows the close relationship between my hand and the material. This, to me, brings clay nearest to translating my inner-self through movement.

When clay is dry it becomes physically fragile and can be broken with little effort. I perceive this stereotypical quality of the material relating to the fragility found in living human bodies.

Because of the physical strength found in metal, other tools besides the hand must be used in order to create a desired shape. A good example of this would be forging which incorporates the use of a hammer and anvil. Not being able to immediately manipulate this material with my body helps me to relate metal to items that are out of my control, such as industry. I have also chosen it because of its obvious widespread use in industry and technology devices.

The work created for this thesis explores different facets of relationships found between humanistic and industrial elements, such as the emotional link to advertising or the correlation between biological and synthetic.

INDUSTRIAL WEAR #1

Industrial Wear #1 displays a symbol of the energy and physical work that once ran the industrial system before being slowly replaced by the machine. Influenced by historical tribal jewelry that often includes within its structure the attributes of the defeated, the slip cast porcelain fingers are meant to represent the once bountiful human labor within industry. (Appendix D) The fingers extend from a fuse, relating them to an element of the industrial system that can be replaced. The mold seams remaining on the bare porcelain are an indication of industrial mass production and a system where hand and product hardly convene.

PLATE 1 “INDUSTRIAL WEAR #1” 6” x 2” x 10”

PORCELAIN, BRASS, COPPER, SILVER, STEEL AND FOUND OBJECT

INDUSTRIAL WEAR #2

Industrial Wear #2, like *Industrial Wear #1* (PLATE 1), is also a wearable symbolic display of vanishing human elements within the construct of a multifaceted industrial system. The circle of slip cast porcelain fingers represents the human element and the cycle of life.

Hieronymus Bosch's "The Garden of Earthly Delights" often includes images of vacant eggshells and fruit rinds to depict the worthlessness and loss of morality in the subjects. (Gibson 82) In the center of *Industrial Wear #2* a small and fragile eggshell surrounds a small staircase and fleeing figure. This is reference to the loss of morality in industry as well as the loss of the physical human touch in process.

PLATE 2 “INDUSTRIAL WEAR #2”

PORCELAIN, COPPER, SILVER, STEEL, BRONZE AND EGGSHELL 5” x 5” x 5”

ELVI SKETCH

In modern pop culture Elvis Presley is one of the first major figures broadcast by mass media. If our pop culture were to be viewed as a religion, then I believe Elvis could certainly be one of the precious saint figures within it. The attention given to Elvis by his fans is equivalent to the attention paid to figures of religious stature. Fans make pilgrimages to the site of his burial, hang photos in their living spaces and some even celebrate his birthday. His association as a pop culture superstar exposed him to vices such as drugs, sex, money and food, of which he sometimes partook, heavily. This, I believe could be similar to a saint being involved in aspects of his faithful practice, at times even sacrificial.

In *Elvi Sketch* the slip cast porcelain face represents the soul of Elvis. He is bedazzled by pop culture, referenced through the placement of sparkly garnets in his eyes. The halo around the slip cast porcelain face of the youthful and complacently staring Elvis, is a reference to Christian portraiture. Often religious figures of importance are shown with golden halos crowning their heads. The metal halo suspends precariously prong set potato chips. The potato chip is a popular pop culture food item produced and sold in the mass market. It is not a food item usually considered to be very healthy, and takes its placement there to symbolize Elvis' unhealthy lifestyle.

However, the piece is also symbolic of mass industry and the fragility of human perception in terms of its susceptible to such things as advertising. The halo is not only pointing out Elvis' sanctified placement in pop culture, but also referring to what is known as the "halo effect." This is the theory that someone can perceive something as good or bad by associating it to one single attribute. It is a phenomena witnessed in human psychology and in mass industry advertising.

For example, often industry will include a celebrity figure into their ads to help sell a product. If the consumer's thoughts about this celebrity are good, the positive association of the celebrity to the product may influence their belief that the product is good, and therefore that they should buy it. Another example would be seeing "No Trans Fat" on a potato chip label. This might lead the consumer to believe that in the absence of a health risk like trans-fats, potato chips may become a nutritional food choice.

In *Elvi Sketch,* internal psychological tensions of the mind hold attributes that can be comparable to the physical make up of metal and ceramic. The generally bad attributes such as hate, fear and dishonesty tend to translate cold bound thoughts, characteristics I relate to the obstinate and rigid composition of metal. The generally good attributes such as love, compassion and honesty foster emotions that are warm and moving, two characteristics I relate to the movement of clay.

Elvis Presley may have had to remain strong for the invasive camera, but there may also have been a lot of internal pressures in his life. In *Elvi Sketch*, the saintly image of Elvis floats amongst a grouping of other porcelain Elvis heads strewn with tears made of metal. (Appendix C- Metal Fusing) This is to symbolize the inner angst that Elvis must have endured through his time as a superstar. The faces are all the same image of Elvis pulled from a commercial ceramic slip mold created during the pop culture industry of the time period. This signifies his reproduced image in the world of pop culture.

PLATE 3 “ELVI SKETCH”

PORCELAIN, FUSED COPPER, STEEL, GARNETS AND POTATO CHIPS 7’ x 7’

PLATE 4 "ELVI SKETCH DETAIL"

PORCELAIN, STEEL, GARNETS AND POTATO CHIPS 8" x 2" 9"

EGG SKETCHES

In many different cultural histories, the egg is used as a symbol of life. In metalwork history the most prominent use of the egg falls within the period of Faberge and his Imperial Easter Eggs for the Romanov family. Every year for Easter Peter Carl Faberge and a few of his close craftsmen created wonderful and unique Easter Eggs for both Tsar Alexander III and Tsar Nicholas II.

Through these technically complicated and beautiful works of art, Faberge intended to express what was happening at the time. As the symbolism of the egg alludes to in multiple cultures, it is what is alive now and not what is dead. (Bainbridge 68) The eggs created by Faberge were reliquaries for events or inventions that encapsulated that moment in history for the Tsarinas to keep as a precious reference from their life.

Like Faberge, I am also creating miniature environments, however I am using them to comment on currently depressing issues that are relevant to my time period. Using the contrast of ceramic and metal, details of *Egg Sketches* show events from my relationship to the industrial world. For instance, in the first detail image (Plate 6) I show my representation for sustainable food and water sources are being tainted and infused with biologically altering substances. For example, the preservatives found in many industrially processed foods have been linked to the creation of cancerous cells. This detail (Plate 6) shows molten centers corroding the egg forms from the inside out in order to accentuate this biological pollution. The process used to create this sketch is physically stressful on the ceramic and metal, which relates to the strain our biological cells endure with synthetic substances. (Appendix A)

I have also highlighted the action that drugs have on physical and psychological conditions of the user. The second detail image (Plate 7) shows the condition of many people in a time where companies can produce and push medications to the point of over-prescription. The stress caused to the material during casting compares to the psychological stress of the drug user. (Appendix A)

Other points of *Egg Sketches* also show currently relevant issues. The lack of human presence in industry paired with the mechanization of jobs leads to the production of the next detail. (Plate 8)

The final detail (Plate 9) visually relates the feeling I experience when having thoughts and views swayed by half-truths and subliminal fear tactics in an attempt to mold and shape my actions.

PLATE 5 “EGG SKETCHES”

MULTIPLE MEDIA 4’ x 3’ x 10”

PLATE 6 “DETAIL 1”

PORCELAIN, CAST WHITE BRONZE, COPPER AND ENAMEL 5” x 3” x 2.5”

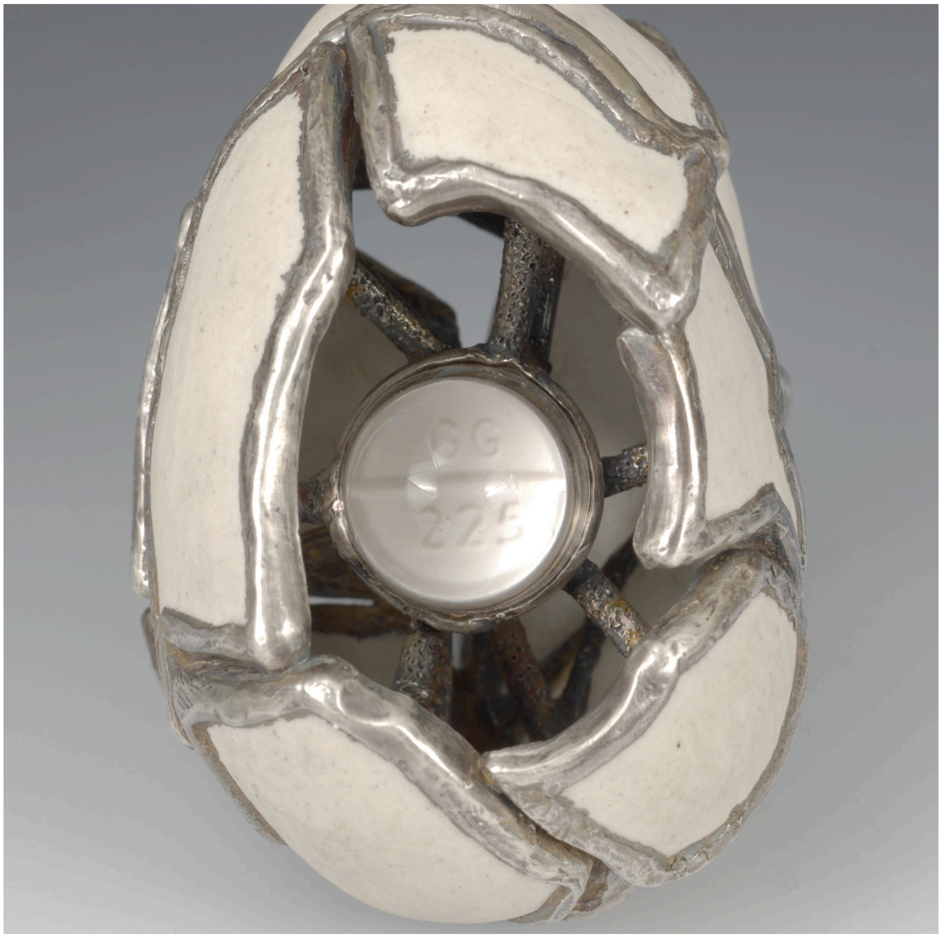

PLATE 7 "DETAIL 2"

PORCELAIN, CAST SILVER, GLASS AND ANTI-NAUSEA PILL 2” x 2” x 3”

PLATE 8 “DETAIL 3”

PORCELAIN, CAST BRONZE AND SILVER 4” x 2” x 3”

PLATE 9 “DETAIL 4”

PORCELAIN, CAST BRONZE, SILVER AND WOOD 2” x 2” x 3”

CELLULAR STRUCTURE

There is a wide use of synthetic materials in today's world and this addition of unnatural substance can change us in microscopic ways. For example, the intake of artificial substances within our food, such as preservatives, can alter the biological structures of the cells within our bodies.

Cellular Structure is an imaginary view of what an effected biological cell might look like after having been altered by characteristics of synthetic substances. The naturally produced emu egg is cradled within a bronze nest-like structure, laden with a conduit of linear pathways radiating from it that is reminiscent of technology patterns. The contrast of fragility between the eggshell and the metal symbolizes a biological cell that has taken on characteristics of the artificial materials. I also see this as a metaphor for intangible human spirit nestled within a massive technological system. Like the egg in this piece, we are surrounded by a multitude of interconnecting technologies that support our ability to survive and be productive.

The vibrant radiation of linear steel extensions surrounding the central figure is a type of halo. In religious imagery aura around a central figure alludes to an inner space of a being, a soul or an essence. In *Cellular Structure* the viewer is drawn inward to the golden space within the egg that carries the fragile ceramic material, symbolic of the natural biological essence.

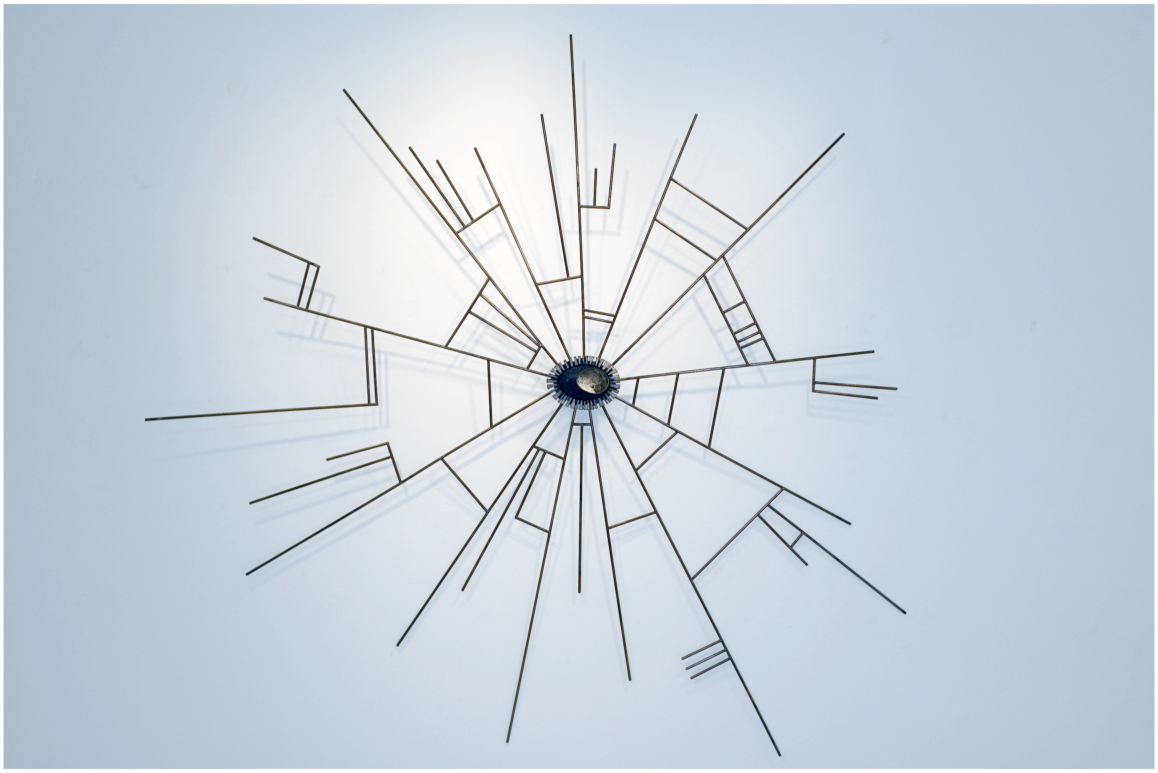

PLATE 10 “CELLULAR STRUCTURE”

STEEL, BRONZE, PORCELAIN, EGGSHELL AND WAX 6’ x 6’

IMPRESSION BROOCH

Telephone poles weave through our environment, blanketing the world as a net-like reminder of the widespread communication system that we have in industrialized society. In the advancement of wireless communications the telephone pole, as well as human-to-human contact, is becoming more and more obsolete.

Impression Brooch explores my thoughts about the abundance of communication technology in the world and the indelible mark that it has made. Telephone poles standing with disconnected lines symbolize the social disconnect associated with recent wireless advancements. The indentations that the poles have made on the porcelain exemplify their existence. The small piece of broken porcelain with the imprint of my hand symbolizes the human condition within the industrial grid of technology.

PLATE 11 "IMPRESSION BROOCH"

WOOD FIRED PORCELAIN, BRONZE, SILVER AND STEEL 4” x 2”x 1.5”

SOUL BROOCH

Industry is interwoven into our daily lives and is a vast and complex system that supports our ability to conduct daily routines and survive in the world. *Soul Brooch* explores the intangible framework that supports our human purpose. Dual metal casting was used to create the structure of this brooch to accent the complexity of the industrial support system that we live in. (Appendix B)

PLATE 12 "SOUL BROOCH"

DUAL CAST COPPER AND SILVER WITH PORCELAIN 2" x 1" x 5"

MATERIAL MERGE #1

Material Merge #1 is an image of copper melted to the surface of ceramic (Appendix C) that was taken by a scanning electron microscope. A scanning electron microscope (SEM) projects a controlled stream of electrons at a specimen for the purpose of reading its topography through contact with surface atoms. Through the addition of vacuum pressure and water vapor, a clear and distinct image of microscopic worlds can be viewed upon the return of this data.

The photograph was taken and converted into a three dimensional image in order to bring the viewer into the microscopic world of the fusion between the ceramic and metal. The novelty of three dimension is evident today within the film industry, and the rush to provide three dimensional entertainment technology to the viewing public.

The use of this microscope not only shows the relationship that I share with this scientific tool of industry in order to capture such an image it also provides a good example of the intermingling of humans with technology.

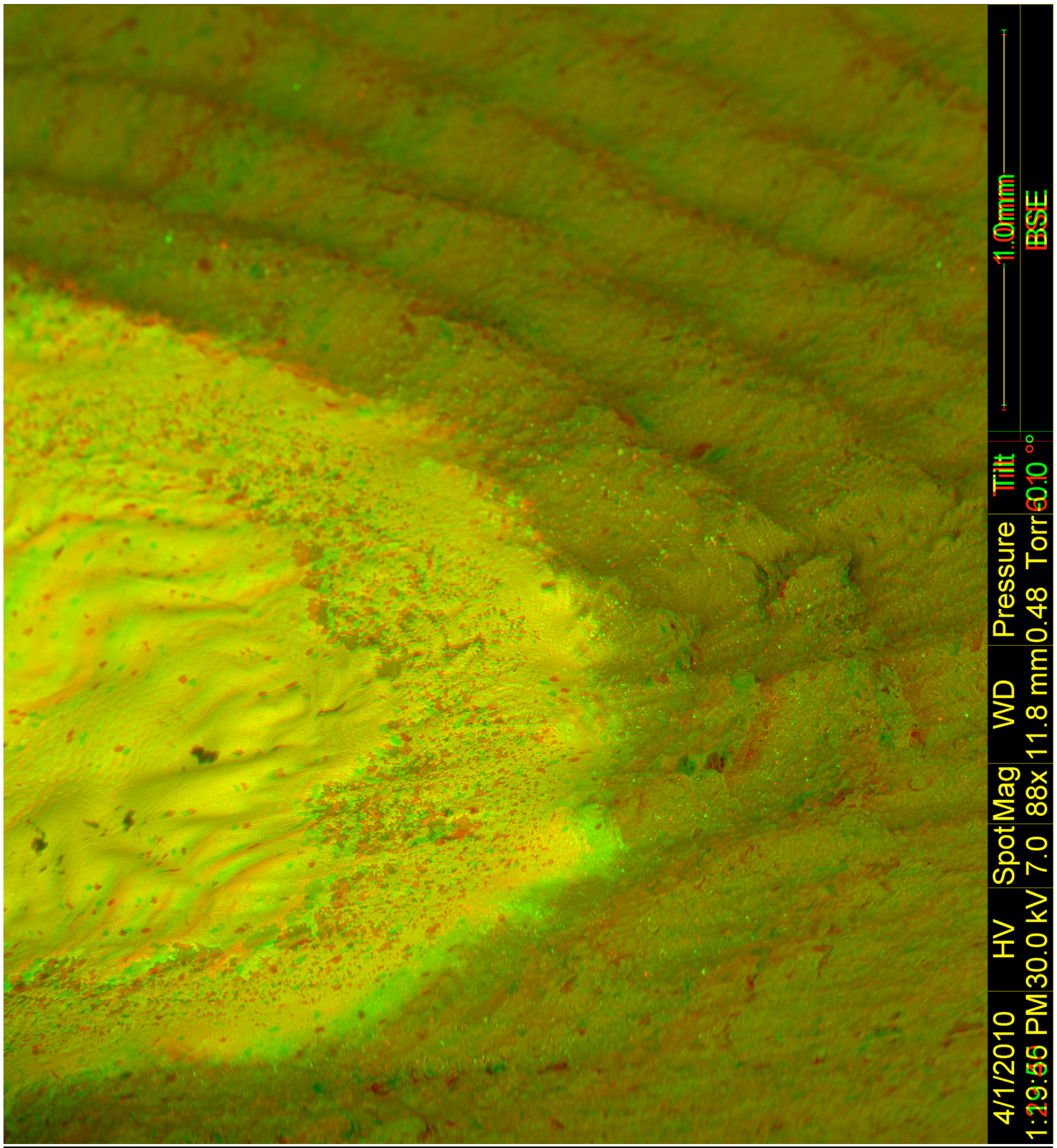

PLATE 13 "MATERIAL MERGE #1"

3-D PHOTOGRAPH 36" x 39"

MATERIAL MERGE #2

Material Merge #2 is a pair of metal-fused porcelain masks. (Appendix C) The viewer must use these special masks to perceive the image of *Material Merge #1* (PLATE 13) with full clarity. The act of the viewer using the mask relates to how consumers wear the mask of uniformity within a mass industrial system. To view the relationship between the two materials, the human viewer is actively engaged with the ocular technology in order to see, but in doing so establishes a relationship with the industrial and technological world.

PLATE 14 "MATERIAL MERGE #2'

PORCELAIN AND FUSED COPPER 6" x .5" x 5"

CONCLUSION

I began graduate school knowing that I liked to experiment with techniques, leading me to investigate and push the boundaries of both material and process. My technical explorations are evident in the pieces exhibited, conceptually inspired by the multifaceted relationships held between humans and industry. I believe the pieces successfully express the contrasting relationship of metal and ceramic, used as a metaphor for the interactions between the human condition and modern industry. This is a subject that will continue to enrich my creativity and inspire me to make many objects, both wearable and sculptural. My creative life will develop from the knowledge I have gained through my research, inspired by my relationship with materials and ideas about how we as humans interact with our surroundings.

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Bainbridge, Henry Charles. Peter Carl Faberge: *Goldsmith and Jeweller to the Russian Imperial Court.* B T Batsford Ltd, London. 1949.

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APPENDIX A

LOST-WAX CASTING PROCESS

The lost wax casting process is a process that has been used since ancient times in order to produce a metal object from a wax model or other combustible materials. The process has been used by multiple cultures over history in uniquely different ways to complete this task. For this thesis, work has been produced using three casting methods: centrifugal, vacuum and gravity.

Making of Wax Model:

Generally, in lost wax casting a model is formed with wax through carving or modeling. However, any combustible item usually works, such as dry organic substances or plastic. For this thesis a soft microcrystalline wax was formed by hand to achieve a desired appearance.

In order to apply metal to the surface of ceramic through lost-wax casting, I begin with the forming of the ceramic piece. The ceramic object must be prepared with holes situated on the surface where metal must be placed. The hole is not a shallow surface indention, but rather an actual hole punctured through to the other side. The size of the hole should be at least 2 mm in diameter in order to ensure a good flow of metal all the way to the opposite side.

Once a ceramic piece has been fired, wax is applied to the surface around the holes. In order to allow for a good connection between the ceramic and wax, an alcohol lamp is used to heat a sewing needle and or dental tool to melt the wax onto the ceramic.

The secure melted connections also guard against investment seeping between the ceramic and wax. If this happens during the investing process, it creates an obstruction in the path of flowing metal and a weak connection in the piece.

To provide a steady foundation to the metal surface appliqué, wax is simply melted in a button form over the surface hole on the opposite side. This creates a circular button shaped "root" for the appliqué on the opposite side.

Sprue Systems:

To begin any casting, a form must be situated with a sprue system. This is basically a highway-like system that metal will travel through to reach the model within the mold.

Lengths of wax called sprues are added to multiple areas on a wax model and angled downward to one central cone shaped point called the sprue base. The sprue base will eventually become the funnel for the flask where metal will enter, filling the negative space left by the model. Usually, during spruing, the wax model that is going to be cast is situated with the heaviest side downward toward the sprue base. This allows the majority of the metal to fill the flask quickly.

During a gravitational pour, "vents" must be added to allow for gas created within a mold to escape during casting. If this does not happen, metal may not flow in all the areas of the model, resulting in an imperfect casting. The vents are lengths of wax added to the points on the form furthest away from the sprue base. They are then redirected downward and attached to an area near, but not on, the sprue base. This allows gas to escape during casting without being filled with molten metal.

Measuring Metal Amount:

To calculate the correct amount of metal needed for a casting, the wax model and sprue system must first be weighed. Once this weight is measured in grams, it is then multiplied by the specific gravity of the metal being cast. This provides an accurate amount of metal needed to fill the void in the mold during casting.

Investment:

To begin the investment process for centrifugal and vacuum casting, the height and width of the flask must be measured to provide an indication of how much water and investment will be used to fill the flask. The investment used here is a fine silica based powder, similar in form to plaster of Paris.

Once the ratio of investment to water is determined, each one is measured out separately. The investment is then sifted slowly into the water. Once submerged within the water, they are slowly churned together by hand. This is then mixed by hand for three minutes, removing lumps and creating a chemical reaction between the materials.

After mixing the powdered investment into the water, the mixture is vacuumed for 1½ minutes upon a vacuum table. This is a platform on which the bowl of investment can be placed, and then covered with a plastic bell jar. The plastic bell jar creates a seal around the bowl and the vacuum pump, allowing for the creation of an airtight environment. The vacuum pulls air bubbles out of the investment, providing less possibility for bubbles to affix themselves to the surface of the wax model, causing nodules on the final product.

Next, the investment is poured into the flask until the wax model is covered completely, all the while taking care not to hit the model within. This could cause unintentional loosening or breakage of sprue system. The flask is then placed into the vacuum for one minute and removed. Extra investment can then be added to the flask to fill extra space and it is left to dry at room temperature.

If preparing the flask to be vacuum cast, the investment is poured a quarter of an inch from the top of the flask. This will provide a void between the investment and the vacuum platform that will help increase the stability of secure suction pulled through the investment.

Burnout of model:

In the process of lost-wax casting the wax model within the mold must be evacuated through applying heat. This can be done by placing the mold within a kiln and having the temperature increase to burn away the wax, or by using steam to melt the wax out.

For the purposes of the work in this thesis, a kiln was used with a set burnout schedule to evacuate the wax from within the flask. Flasks are first placed into a kiln and the temperature rises in a series of increments until at a final temperature of 1375°F. It is then held at this temperature for 2 hours then cooled to 1000°F where it remains until casting. Through the steps of this burnout process, the wax model is slowly burnt away leaving a void in the shape of the wax model.

Casting:

Once the wax has been evacuated from the flask, casting can begin. For the work created in this thesis, a team of two people was used to conduct the casting procedures.

The centrifugal method uses a centrifuge, which is a steel-arm mounted to a base that rotates at a high speed using centrifugal force to inject molten metal into the mold. First, the centrifuge arm must be wound and then held in place by a supportive pin. This creates stored energy that will be released in order to send the metal into the mold.

Next, the correct amount of metal is added to the crucible, which is mounted to one side of the arm. It is then heated with an oxygen and acetylene torch system until it has reached a molten state. Once the metal is fluid, the flask is retrieved from the kiln by one of the team members, and situated into the cradle, which is opposite the crucible on the arm. The pin holding the arm in place is then dropped, releasing the centrifuge arm causing it to swing around and force all the fluid metal within the crucible into the void with in the flask.

For vacuum casting, instead of using stored energy to inject the mold with molten metal, a vacuum platform sucks the metal into the model. For this, a hand crucible is used to melt the metal. Once the metal reaches a molten state, the flask is retrieved from the kiln and placed, funnel side up, onto the vacuum surface plate. When the vacuum is turned on, an airtight seal is created between the platform and the flask causing air to be pulled through the invested flask. The molten content of the hand crucible is then poured into the flask funnel, and is sucked into place by the pull of the vacuum.

Clean up of cast model:

After the model has been cast, the flask is cooled. The model is then removed from the investment. The sprues are then cut away from the model and the remaining traces are sanded and buffed away.

APPENDIX B

USE OF DUAL METAL CASTING

Traditionally casting of two metals is done by casting one metal and then in a separate casting, applying the second metal around the first. Another way to cast two metals at once is to melt both in separate hand cruicibles and pour them together. This method is only efficient in vacuum and gravity casting. When I came to graduate school I wanted to test out the possibility of casting two metals at once using the method of centrifugal casting. To do this I needed a crucible that would have two chambers in order to keep the molten metals separate until they combined within the flask.

For casting two metals at once for the centrifugal method, and having them stay separate until reaching the model within the flask, I devised a double-chambered crucible that is used along with two dividing sprue tracks.

The crucible itself is composed of alumina refractory, a substance used in high temperature environments such as iron casting cupolas. It is moldable like clay and allowed me the ability to shape two separate chambers and exit holes. (Plate 15)

The sprue system that is attached to the model has two separate sprue bases. Each base aligns with the corresponding hole on the crucible when in casting position. The direction of the sprue tracks from each base is dependant on the model itself and the desired direction of each metals travel.

To find the appropriate amount of each metal for the cast, the total weight of the wax is divided in half and each half is multiplied by the specific gravity of the metal it is assigned.

When casting, the two metals are placed in there separate chambers and heated at the same time until molten. Upon releasing the weights on the centrifuge, the molten metals are directed down separate pathways until they reach the model and combine.

This usually results in a full combination of the two metals within the model, however it occasionally produces interesting visible fusions of the two metals.

PLATE 15 DUAL CHAMBERED CRUCIBLE

APPENDIX C

METAL FUSING

If applying metal through fusion, metal is affixed to the surface of the unfired clay and then placed in the kiln for firing. The temperature of the kiln must exceed the melting point of the metal, but not go too far beyond the vitrification point of the ceramic. For this thesis, the porcelain containing inclusions of copper or bronze was fired to a temperature of 2400°F.

APPENDIX D

MOLD PREPARATION AND SLIP CASTING

In the slip casting process, ceramic slip is poured into a plaster mold to achieve a hollow positive of a model. For this thesis I used a model of my hand, which I constructed myself, and one of Elvis Presley, which I obtained from my Great Grandmother's ceramic mold collection.

To begin making a mold of my hand, I first have to create a positive in wax. This is achieved by painting on a silicone-based molding product. After placing my hand in a position that I wish to duplicate, a friend paints on the two-part mixture. In about 15 minutes the rubber-like surface is dry and I am able to slip it off like a glove.

To achieve a wax positive of this model, the empty rubber shell is suspended within a box while sand is carefully deposited around. This is done it in order to create a supportive environment around the rubber shell. Wax is then melted on a hotplate until liquid, and then poured into the rubber shell. Once cooled, the wax and rubber shell are placed in a freezer to help the wax solidify further. This helps to prevent loss of detail during the removal of the rubber shell. Once the shell is removed, defects in the wax are corrected through the addition and subtraction of wax on damaged areas.

In order to make a mold of my wax model, dividing lines must be located as guides. Each separation line must be located at a point on the model that allows for the easy removal of a mold section. There should be no undercuts or curved areas that would obstruct a section being easily removed from the model.

Once these lines are determined, the molding process begins by working on one half of the model at a time. If it is a model requiring more than two sections, the process still begins focused on only one half of the wax positive.

The wax positive is imbedded into a slab of wet clay on a board. Wet clay is used instead of oil clay for its easy removal from the finely detailed surface of the wax. It will also act as a faux section, supporting the plaster that will be poured in. The clay extends horizontally outward from the wax positive at least two inches all the way around. Clay is then built up around the wax until it reaches the central dividing line for that section of the mold, carefully creating a surface free of undercuts.

After the mold lines have been joined with clay, four boards are placed around the wax and clay in the shape of a square. C-clamps are used to secure them in place. Clay is moved to bridge the gaps where the support does not meet the boards.

A measurement is then taken to determine the volume of the area needing to be filled with ceramic molding plaster. Referring to the chart of proportions (Appendix E), water and plaster are measured separately for the needed volume. The ideal ratio of water to plaster for a slip casting mold is 1:1.3 by weight, and it is important to maintain the water temperature at 72°F in order to ensure the consistency of the mix.

The plaster is then sifted into the water where it soaks for 1½ minutes, and then mixed by hand for 3 minutes. Finally, the plaster is poured into the prepared mold section. This process is repeated until all sections are complete. Before the addition of new sections, areas of dry plaster that will be in contact with new wet plaster are first seasoned with oil soap to prevent an accidental bond between the two.

APPENDIX E

Proportional Guide of Plaster:Water

Water @72˚F/22˚C		Plaster	
1/2 pint	236 ml (cc)	11 oz.	312 grams
1 pint	473 ml (cc)	1 lb. 6 oz.	624 grams
1 quart	946 ml (cc)	2 lb. 12 oz.	1,248 grams
1 1/2 quarts	1,419 ml (cc)	4 lb. 2 oz.	1,872 grams
2 quarts	1,892 ml (cc)	5 lb. 8 oz.	2,497 grams
2 1/2 quarts	2,365 ml (cc)	6 lb. 14 oz.	3,021 grams
3 quarts	2,839 ml (cc)	8 lb. 4 oz	3,744 grams
3 1/2 quarts	3,312 ml (cc)	9 lb. 10 oz	4,388 grams
1 gallon	3,785 ml (cc)	11 lb.	4,992 grams
1 1/2 gallons	5,678 ml (cc)	16 lb. 8 oz	7,488 grams
2 gallons	7,570 ml (cc)	22 lb.	9,984 grams
2 1/2 gallons	9,463 ml (cc)	27 lb. 8 oz	12,480 grams
3 gallons	11,356 ml (cc)	33 lb.	14,976 grams

* 946 ml water + 1,248 g dry plaster = 1,330 cc mixed plaster

1 qt water + 2 lb 12 oz dry plaster = 81 in^3 mixed plaster

Final mix will yield approximately 1.4 times the volume of water

Conversion Guide

1 pint =	473 milliliter (ml)
	28.875 cubic inch
	16 ounce

Plaster Preparation Guide

1. determine volume needed
2. measure water
3. measure plaster according to chart

0.5 quart
0.125 gallon

1 cubic inch = 16.4 milliliter
0.035 pint

1 quart 2 pints

1 gallon = 8 pint
4 quart

1 milliliter = 0.061 cubic inch
1 cubic centimeter (cc)

4. add plaster to water
5. SOAK for 2 minutes
6. MIX for 2-3 minutes
7. pour

Island method does not work.
Measure for quality and consistency.
Do not ever flush plaster down the drain.

Please keep this area in an orderly and clean condition. Thank you.