

Form

Bram Locknick
Bachelor of Craft and Design
2023



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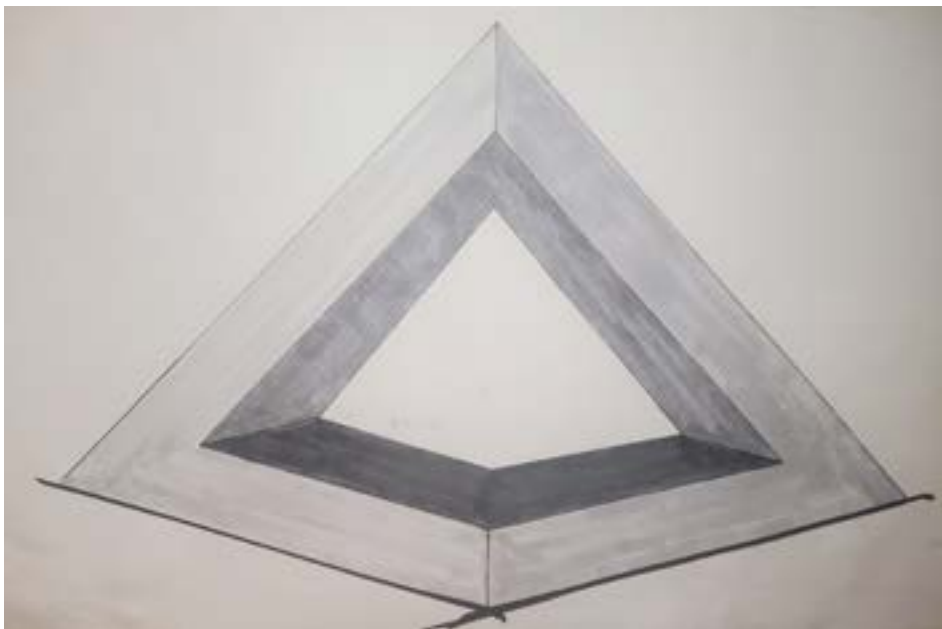
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Bibliography

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Scott Laughton



Bram Locknick is an artist and sculptor who works primarily with glass. Being from Windsor Ontario he was inspired at an early age by the Detroit skyline. He first discovered glass after a brain injury in 2015. With a background in philosophy he follows his curious instincts in order to develop conceptual work and translate those concepts into glass into glass. His artwork and design is pursuant knowledge and of a process that seeks to translate concepts and emotion into sculptural works. Glass as a medium fits perfectly with the combined conceptual and material process, its innate qualities that allow it to be sculpted using hot and cold and its transparency establish a link between the material and concept, the abstract and abstraction. The design of the work uses common forms in an attempt to share meaning and his own feelings. The method of design is apparent through his inspiration from abstract minimalist sculpture using basic features or elements for composition and American realist artworks that present the shared elements of experience or feeling.



Explorations in Abstract Minimalism

The work for this project has been a delving into sculptural glass through casting and cold working. Sculpture being any type of 3-dimensional art, I wanted to explore this in a simple and minimal way. Exploring sculpture in a minimal way meant using the very definition of sculpture as the subject for the material rather than applying an extraneous topic, this would be the direction that the work would eventually take. The starting point would be the use of the point, line, face, and then extension of that face into space. The exploration would be guided by the use of that set which could be used as components for making sculptural work. Aesthetically I wanted to use basic and familiar forms to create something both unfamiliar, minimal, and logical.

Initially the work was inspired by math art which applies mathematics as a concept for the creation of artworks (Ornes, Steven. Math Art p.ix). Geometry, became a natural and logical starting point with its focus on shape, objects and space, along with the many visuals that accompany it. In looking at a basic shape it could be broken down using dimensions into faces, lines and points as well as edges, vertices and volumes, a single thing could be broken up into subsets and parts. Rather than use whole multiples of a single unit and stacking, arranging or using another method of construction I would use a single shape. This shape would be regarded

as a set of its dimensional parts and those points, line and faces would be modified into a form.

Form, shape and dimension would all act together as drivers for the concept and the work. The three would act as operations which affected the sculpture. An operation being any act used to sculpt a form. The form would be the abstract notion, a mental building block, the idea of the shape to be formed. The shape would be any type



Fig. 1

of physical articulation which was decided upon (sketches or models). The shape would typically relate to one of the Platonic Solids which are a set of 5 polyhedrons, each face is made up of the same polygon, consequently each edge attaches to the same type of polygon (i.e. each square is attached to four other squares forming the six sided polyhedron called a cube or an equilateral triangle attaching to three other triangles forming a tetrahedron)(Ornes, Steven pg.46). Dimension, would be the avenue used for modifying the shape, and although it would be used like a sculpting tool on the shape plotting points, using lines for demarcation of the pieces boundaries, deciding where material would be removed. Each is a type of tool used in the



formation of a sculpture, and they function as operations when relating to each other to create the form. The shape is the action of the idea, as the dimension is the action of extension in space.



Fig. 2

Additionally abstract minimalism would be a great aesthetic influence. Here it was important to distinguish between pure abstract and near abstract, the sculpture will be pure abstract, not referencing any pre-existing objects (Barr, Alfred. *Cubism and Abstract Art* pg.28). Albeit this came with the exception of the influence of American artist Tony Smith. The sculpture will not represent other objects, however it will use parts of preexisting abstract forms (i.e. the cube). The work would not refer to the cube or sphere in the same way that a stone sculpture of a person does not refer to the shape of the block that it started as but rather simply uses its dimensionality. Abstract minimalism refined the scope of the sculptures, although the parts that I would be using could be articulated using mathematics I was not trying to express anything mathematical, the math of the subject was secondary at best. Beyond the parts I wanted to use,

the influence of abstract minimalism provided avenues and some definition for considering the parts I wanted to use. The work of the American artist Tony Smith inspired pieces which use to square as a base unit of construction. In particular the piece titled *We Lost* from 1962 which itself was based on another titled *Free Ride* by the same artist in the same year. This work took its inspiration from gyroscopes used in aeronautical engineering (tonysmithestate.com). With this in consideration some of the work is referential to Smiths work, however this inspiration led to further material exploration in addition to exploration in form and style.

As the work fits into the category of abstract minimalism, both abstract and minimal ought to be explained in the context of the creation of the body of work. The work here is abstract, in the sense that it is non-representational of any one particular thing like a physical object, event or place. The abstract here is distinguished from particulars with respect to form, particulars typically refer to a function say containment for a bowl or a cup, or art forms may refer to the idea of beauty in relation to a thing. The sculptures here don't refer to a function as such, rather they refer to geometry for which there is no function for the viewer to use when viewing the object only the idea, the cube has no function as such. Although elements of geometry may lend themselves to structure, or as an instrument for measuring, these are effects, for example: that we can measure a 90 degree angle does not determine that angles qualities. So while the sculptures may use geometry they do not reference

secondary qualities or relationships. In addition the forms used cannot reference a sphere or polyhedron as particular things as there is no particular thing from which said shape can be drawn upon by the artist (in this case), there is the idea and the ability to understand such things as ideas. With respect to employing the abstract the sculptures also fall into the category of conceptual art as the sculptures are dependent upon the idea of abstract universal geometry.

The work also partakes in the idea of minimalism. This is true not only in the use of basic geometry but also in the absence of decorative elements in the pieces. Each sculpture makes use of a single geometric form, a cube, a sphere, a triangle. While the operations that are used to affect the form in space are many they are still simple like a series of zeros and ones used in code to yield a simple result, just because there are many does not make the forms complex they are merely the result of repeated minimal operations. Even if the basic geometric forms were combined into one sculpture I believe they could still be considered simple with respect to only using a few operations. Albeit, it can be argued that just because a thing is one does not necessarily make it minimal, the universe can be considered a single thing yet because it contains many things can be considered maximal given its vast number of parts. However, the works presented were not created with the aim of providing any insight into a debate as to whether there are many or one thing. It remains that per-

spective and perception can make anything maximal or minimal and the maximal can be seen minimally and the minimal can be varied and complex. In addition the ornamentation and use of decorative elements is minimal. The pieces structure and material makeup are the only elements that could be considered ornamental or decorative. However, the basic elements which extend the object into space are devoid of these things. The taking up of space, the extension of the object and its limit (where the thing ends) is the limit of its decorative or ornamental capacity. This is similar to the way in which Judd explains the physical limits of a painting in *Specific Objects*, its physical limit and boundaries devoid of its contents making up the art. The surface and lines, the objects raw physicality, make up the piece. As the pieces are transparent the optics echo or reflect the bare physicality on the interior of the pieces.

The body of work as it is driven by exploration and extension of geometric forms partakes in the field of conceptual art. That is to say that the process and method are what drive the work forward rather than an outcome based approach which can direct the viewer what to feel or think, this way of working stems from Sol Lewitt in his *Paragraphs on Conceptual Art*. In this respect the work is a part of a mechanistic process which was derived before the making of any one object, a mental image of the end result did not precede the concept or drive it forward (Lewitt again) except for perhaps a desire for quality of glass without any unintentional results not being the result of the method.





Fig. 3

Heiki Brachlow

This German born glass artist primarily creates kiln formed sculptures. Seeing this artists work the first thing which stood out to me is the emphasis on abstract form, as opposed to surface decoration such as patterning and illustration. The forms that Brachlow uses have a minimalist, geometric and modular nature which contribute to the works pleasing aesthetic and utilize glass translucence and optics as integral elements sculpture. In addition Brachlow has used modules so that some of her works, while they can stand alone, can be used as parts with other units of the same mold or cube form.





Fig. 4

Petr Hora

This Czech artist makes use of simple forms and long hours of exceptional craftsmanship to create flawless sculptures. Hora's work is not only glass art but reflects the art of exceptional glass making in its execution.



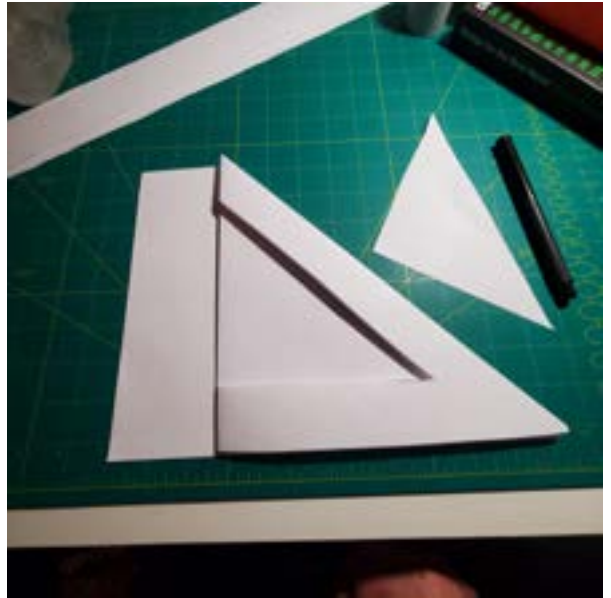
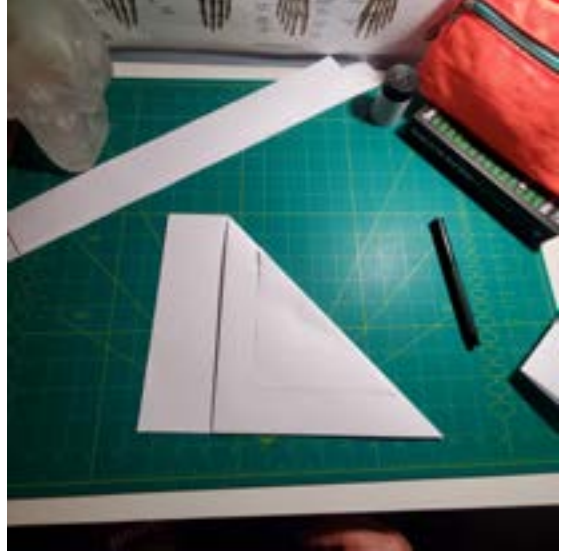
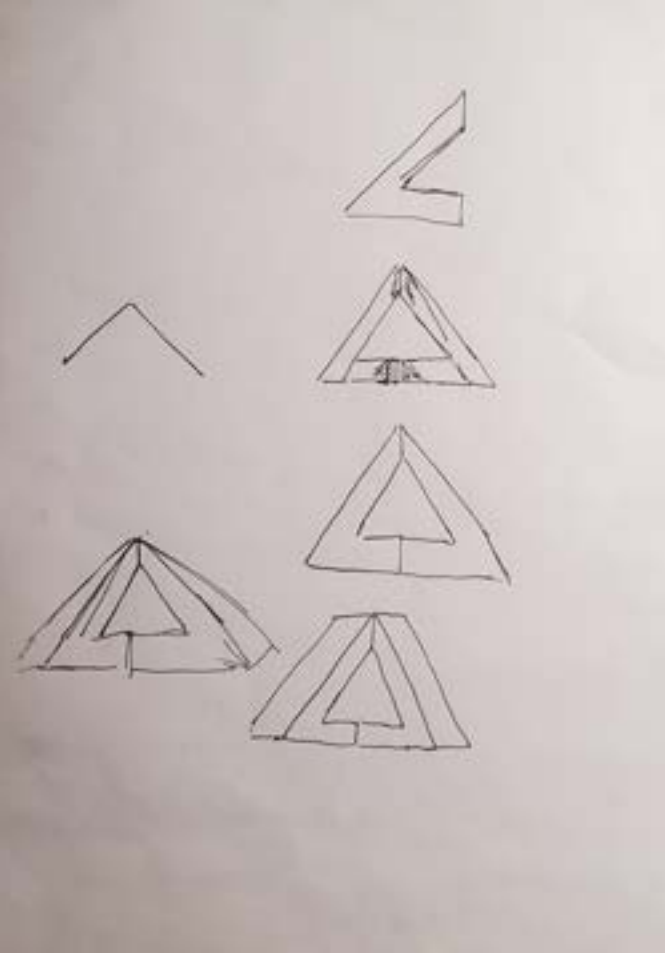
Fig. 5

Tomas Brzon

Brzon, like Hora is an exceptional Czech glass artist whose work uses large scale cast, cut and polished glass. His technique not only accentuates the external form that he creates but also creates internal geometry using optics. Use of light and optics to the effect of creating internal structure is making the forms surfaces and edges as parts or modular elements.

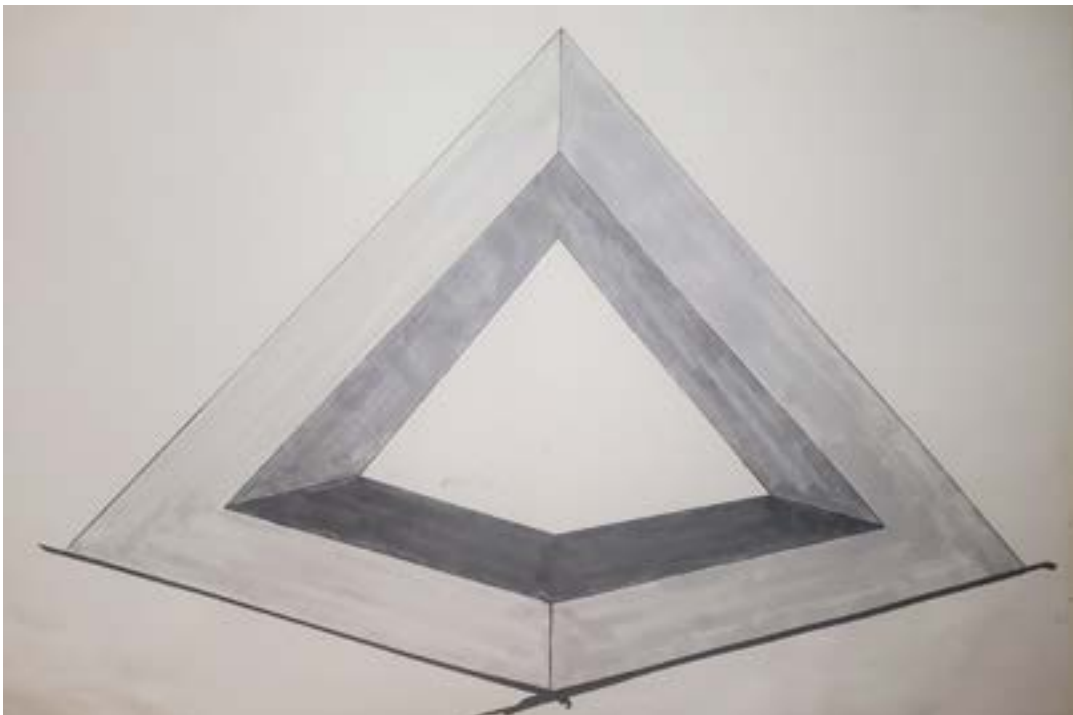


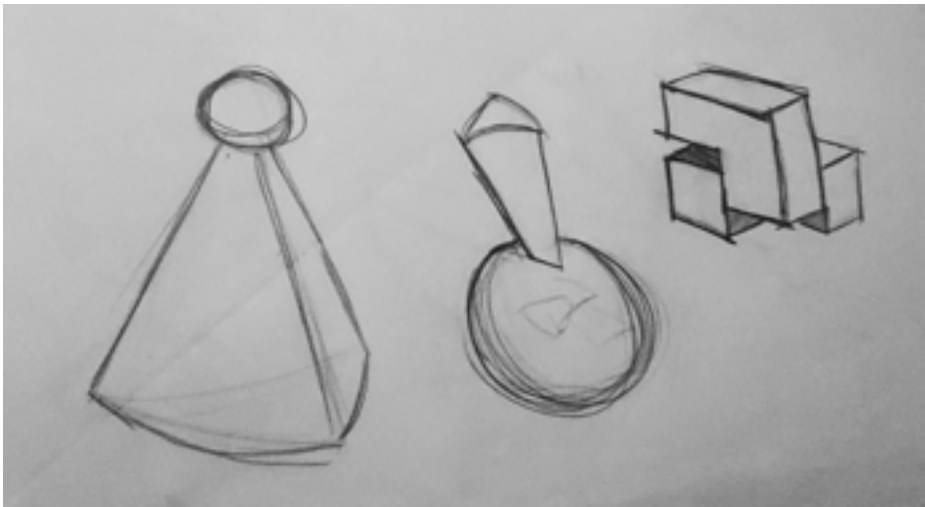
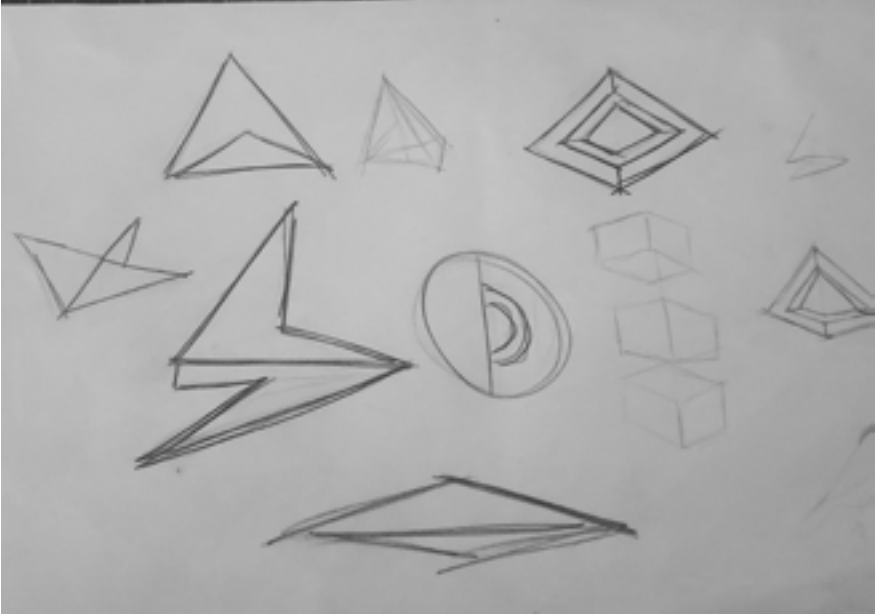
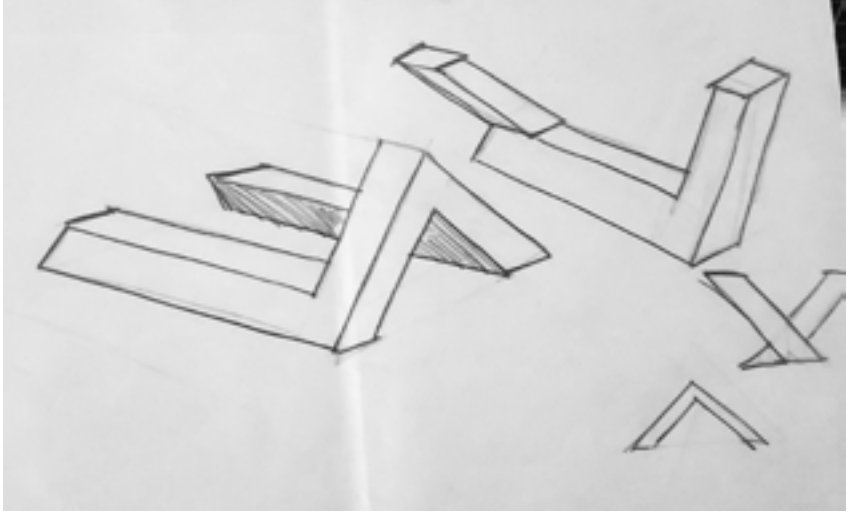
SKETCHES



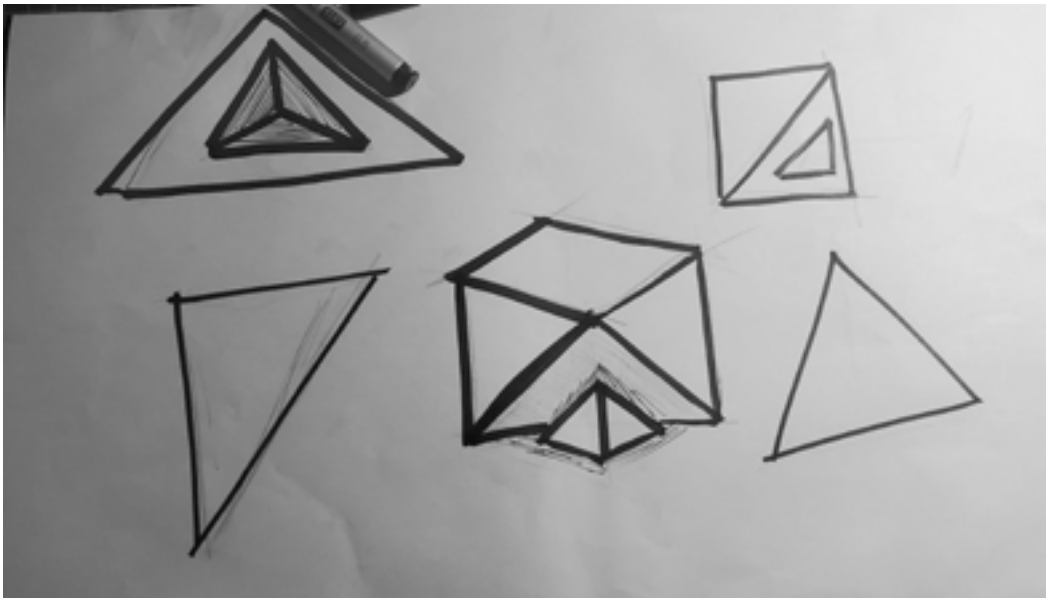
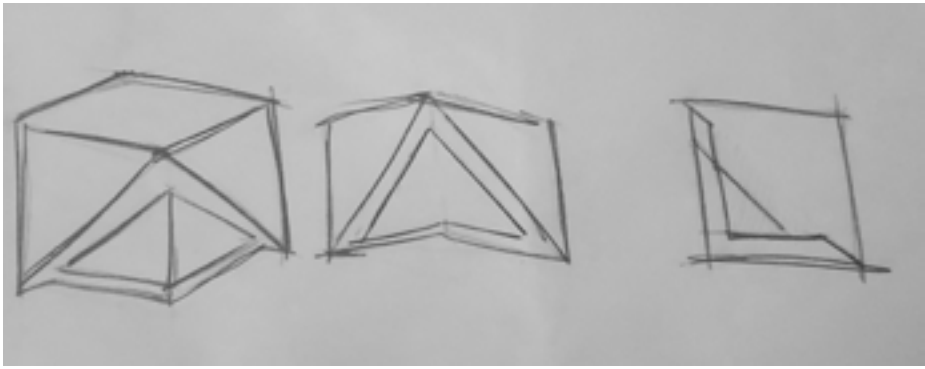
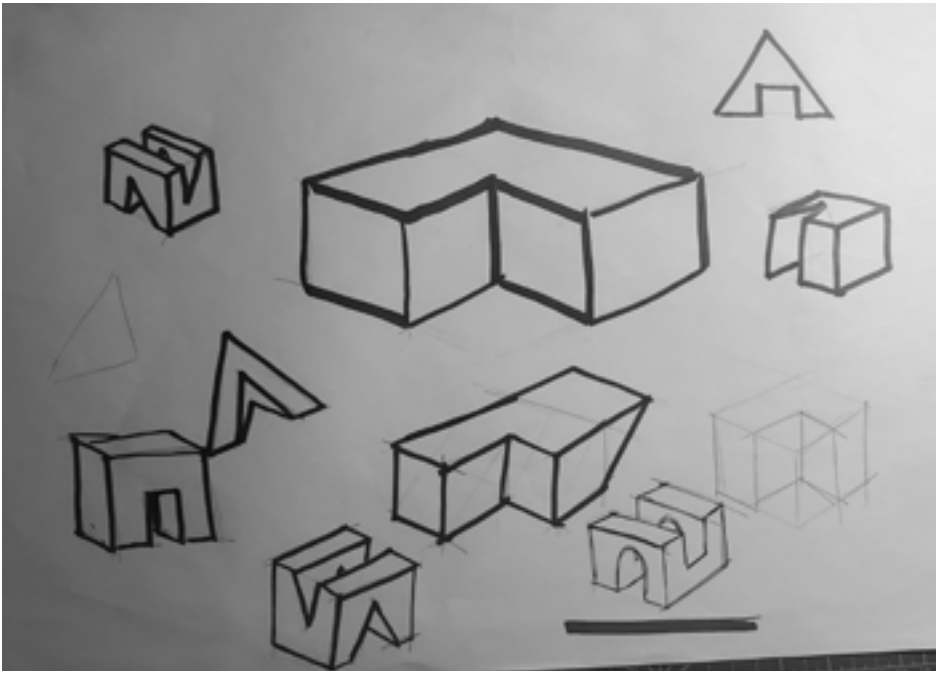
Sketching

Sketching in my process is not only illustration using pencils and markers. Sketching is a means to translate an idea from the mind to the outside world, where illustration does often suffice it is not always sufficient in my process to initially communicate a form to my other senses. So the sketch is the initial step of translation and transformation from idea to form. The use of a paper construction was pivotal in this transition from idea to object as I could not always communicate using pencils and markers. Once the paper construction took form I began to understand how I could use illustration to complete the sketch.

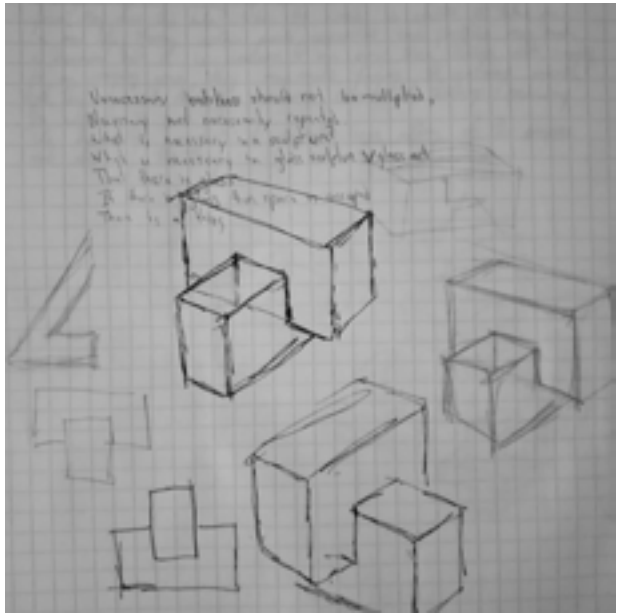
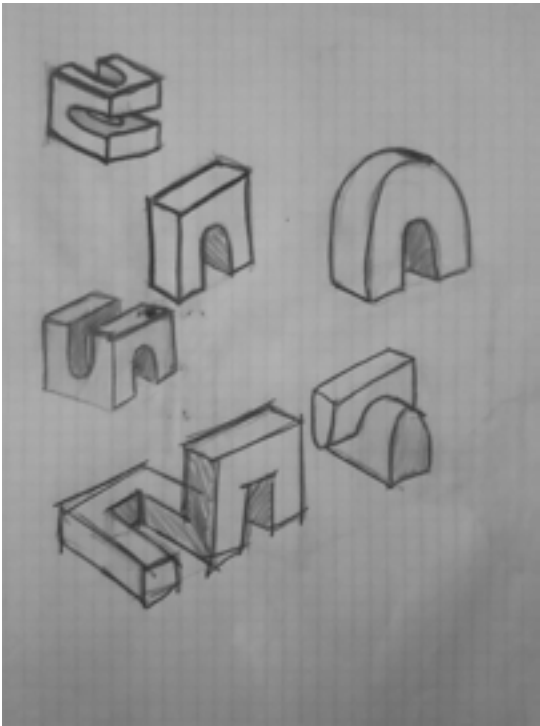
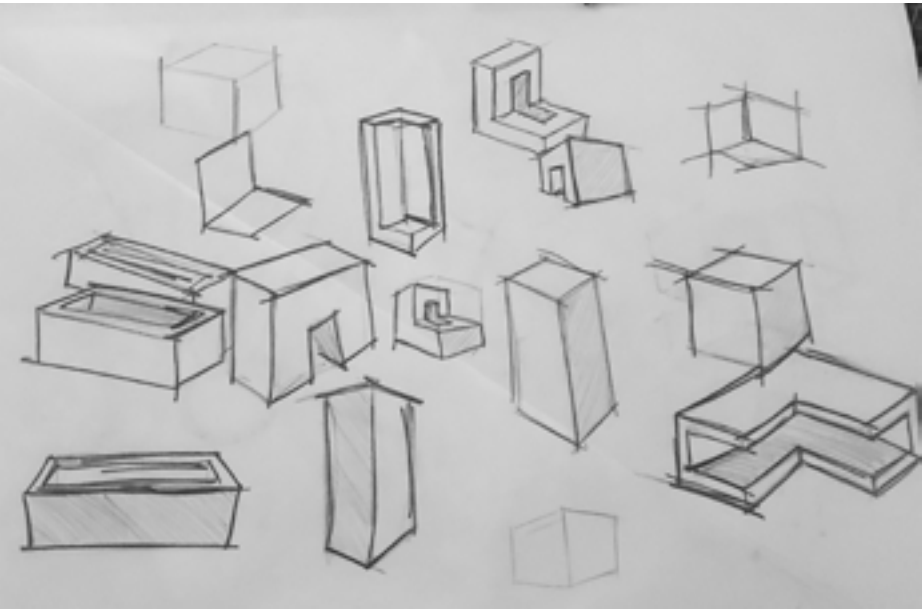


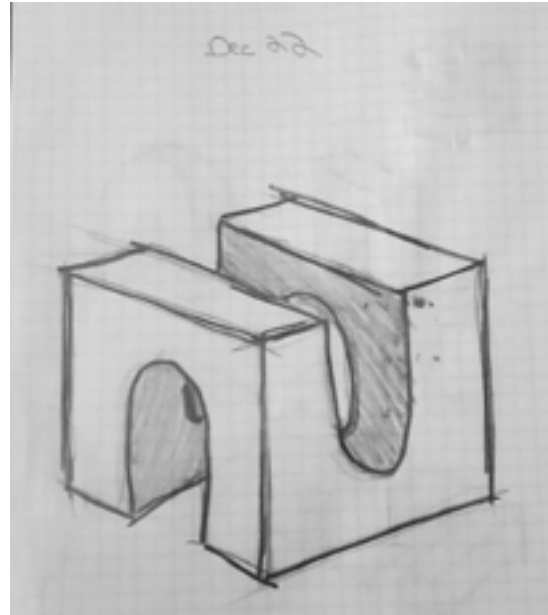
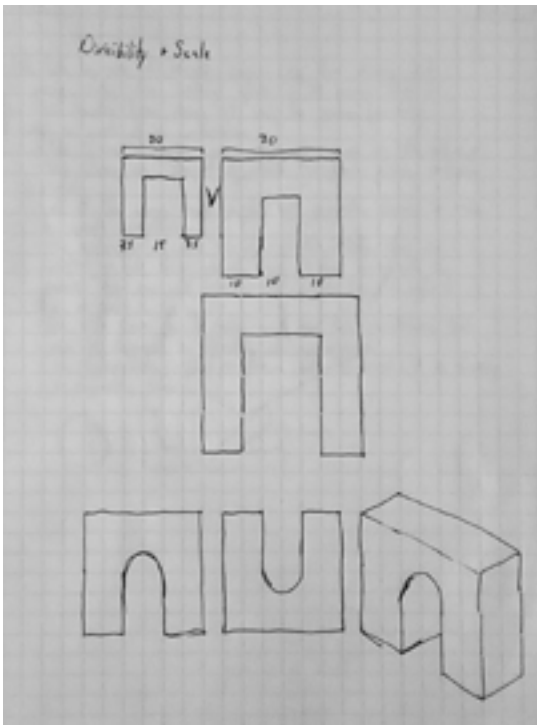
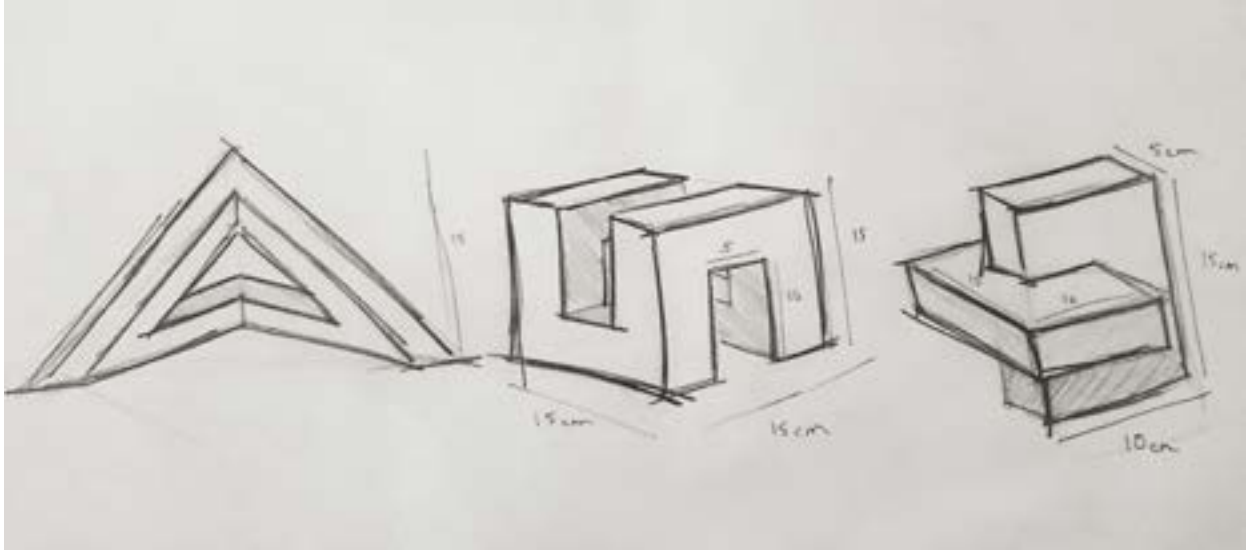


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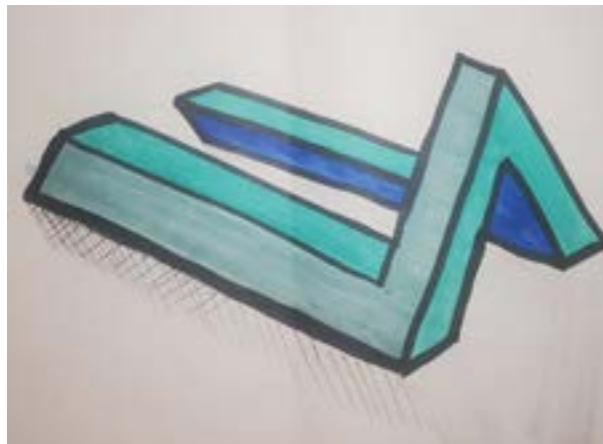


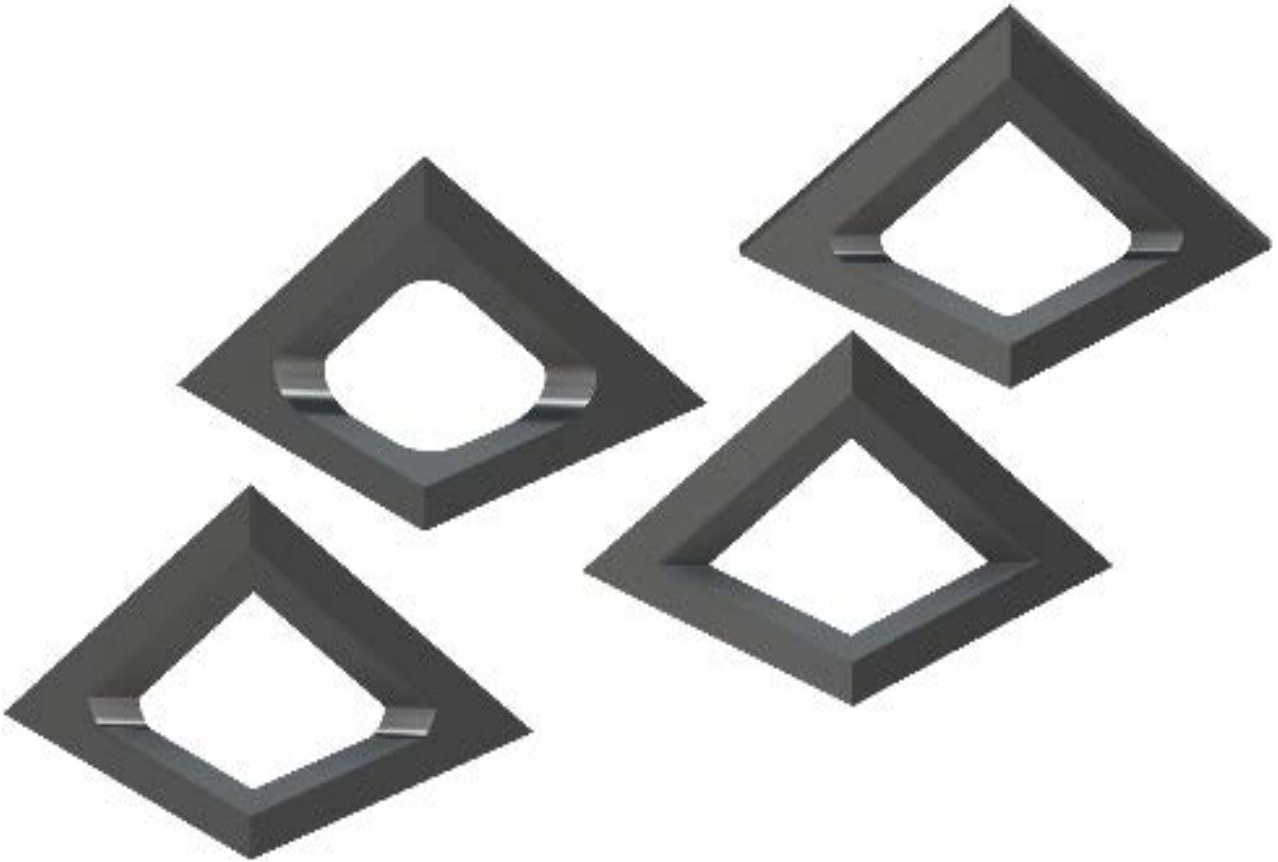
SKETCHES





CAD modeling would prove invaluable for completely visualizing Chevron. With this method I could use the triangle as a base for extension and then apply subtractive tools to get a drawing that I could 3D print.





Chevron drawings, variations and views.





SKETCHES

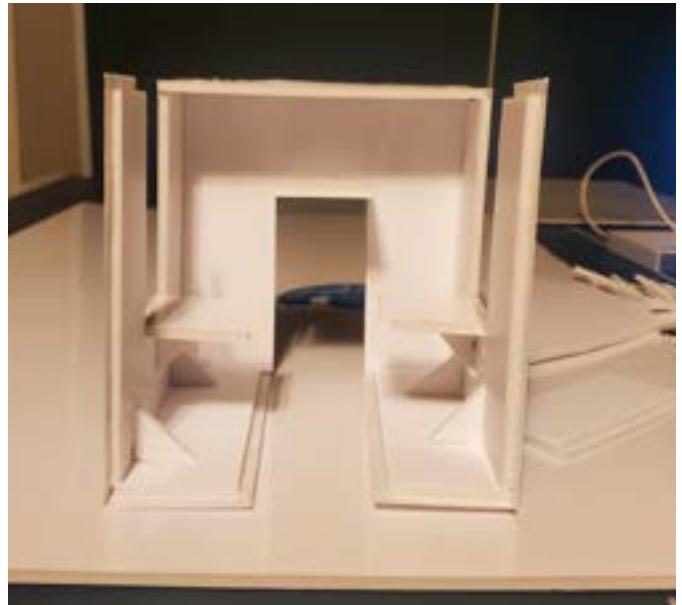
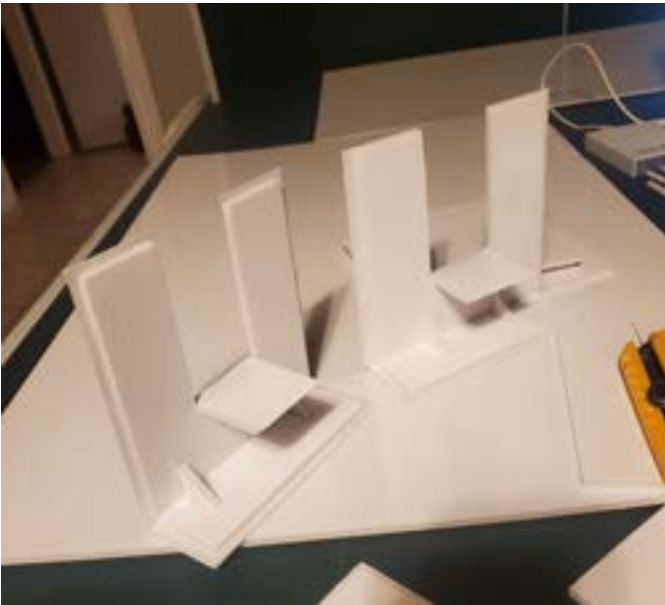


Sketching throughout my process allowed me to move from the idea of a form or solid as an idea to something that was communicable in dimension and shape. It is a crucial step whether using pencil and paper or folded pieces of paper with tape.





It was decided early in the process that no master mold, from which multiples of each model could be poured in wax, would be made. The capacity to make multiples of each was not necessary for the concept. Albeit, some models were repeated.



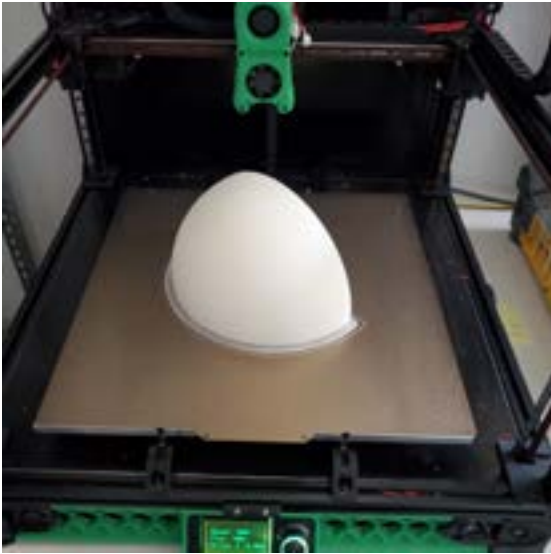
The models would be constructed using foam core. Each face would be cut out and hot glue would be used to attach the faces with internal supports to prevent distortion of the forms. Once complete excess hot glue would be trimmed off and the piece would be sealed with packing tape to prevent mold making material from leaking into the model.





Each face would be carefully measured before being cut. If multiple pieces were required then one face could be cut out and then used as a template for the additional faces.

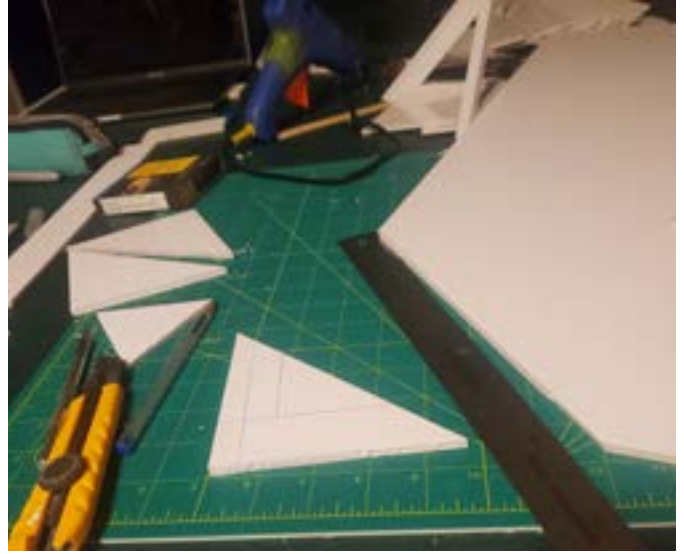




3D printing was a valuable process in the model making process for the piece titled Chevron. Initial attempts at sketching proved challenging so once a CAD sketch was finished it could be printed. The print gave me a concrete model for how the piece would look.



Chevron 3D print at 15x15x15cm.

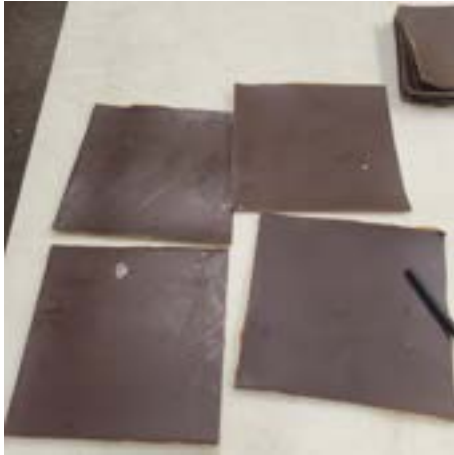


The printed model was used as a square and to trace the angles of each face to ensure consistency through the construction process.





Having the exact alignment and dimensions in the model to ensure integrity through the casting process. In addition maintaining the flat surfaces of the model would assist with the grinding and polishing stage of making.



Wax models were attempted using wax sheets as though they were foam core and then fusing the faces together. This method was not viable as each face warped significantly.





Trio of models. Front to back 3D print(PLA plastic), paper model, foam core positive. 3D print sitting in foam core positive.



3D print sitting in foam core positive.







Molds for the kiln would be built using a one to one to one mixture of plaster, silica and water by weight. Each mold would have three layers built of this mold mix.



All ingredients for each layer would be gathered. The plaster, silica and water for each layer of the mold would be slaked and mixed before the application of that layer.





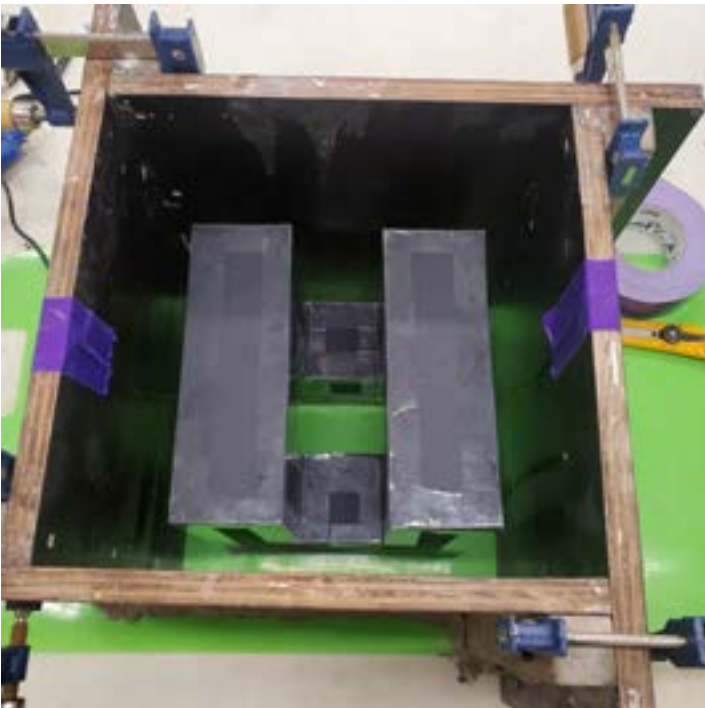
The positive would be glued to a mat and vents would be added, this allows air to escape the mold so that the glass could flow evenly through the channel without the formation of air pockets.

With the model ready and my plaster, silica and water ready to be mixed the hand building of the mold could begin once the mold mix began to harden.





As a result of some of the forms used, the body of the mold would be poured to ensure crisp interior angles. Polystyrene foam was used to create a reservoir to contain additional glass for casting.





After the mold was constructed the reservoir material would be removed and the model would be destroyed while removing it from the mold. The foam core being rigid, would need to be softened using steam and hot water. After an hour of steaming the positive would be carefully torn out using needle nose pliers.

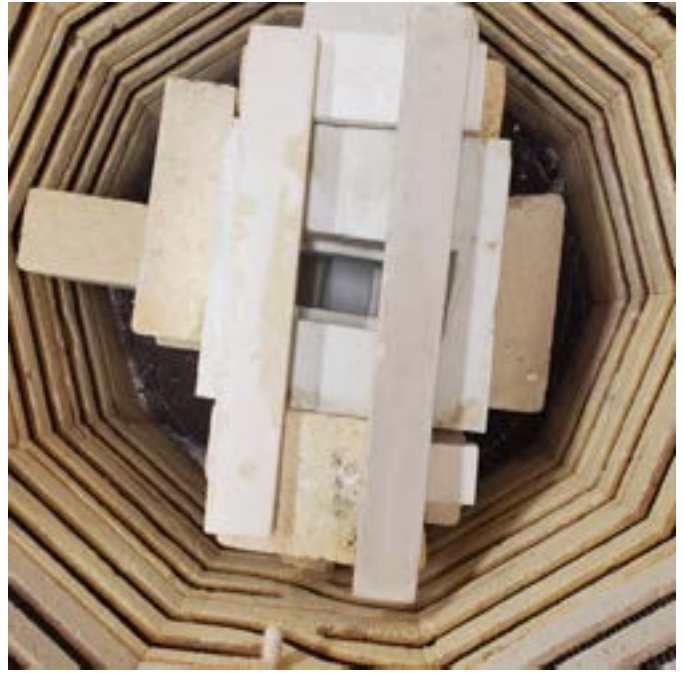




CASTING



The amount of glass used would be determined using water displacement. Then the glass would be cleaned to removed any contaminants. The glass would then be carefully placed in the mold to prevent any plaster from being scraped off the mold, contaminating the glass.



Molds would be set up in the kiln, placed on sand and the sides of the mold reinforced with kiln brick. Sometimes a pot would be used as a reservoir to fit all of the glass needed for the casting.



CASTING



On several occasions the kiln would need to be opened while firing at 850 degrees celcius to fill the mold with preheated glass. This was done when the reservoir could not fit all of the glass needed for the piece.





Several pieces were cast using the hot slug method. This is where a piece of glass is made in the hot shop and knocked off of the pipe straight into the mold being fired. It is important to ensure that hot shop tools are very clean and to touch the glass with hot shop tools as minimally as possible to avoid contamination. Using glass that had been annealed before casting consistently resulted in devitrification (the formation of crystals in the glass) which interfered with the optic purity. Using the hot slug casting method maintained the optic purity of the glass.



CASTING



Sand casting, when hot glass from the furnace is poured into molds made from sand was also used. This method was selected to accommodate scale and to ensure optic purity. The positives were 3D printed with handles to easily remove them from the sand and additional space to compensate for glass shrinkage. Acetylene and plaster were used on the interior of the mold to ensure a fine surface on the glass. Unfortunately very few of these pieces were viable due to cracking.



De-molding



After casting the peices would anneal going from a top temperature of 850 degrees celcius down to room temperature. This process took between 260 and 450 hours. Once complete the glass piece would have the plaster silica mold removed from around it. The majority of pieces made using plaster silica molds were annealed sucesfully. Only one piece was cracked on removal from plaster with another being completely unusable due to what was determined to be bad glass(Left, bottom right).





The cold processes used to finish the pieces were by far the most labour intensive and risky in terms of breakage and cracking. I knew that I wanted to bring the outside faces of my pieces to a high polish to use the optic qualities of the glass. Moving from the coarse grits to remove excess glass and flatten faces, all the way to a fine polish. The cold working process would allow me to add complex optical effects contrasting the simplicity of the form as well as multiply the form on the interior. Cracks and breaks would occur during this process making it emotionally difficult and strenuous.

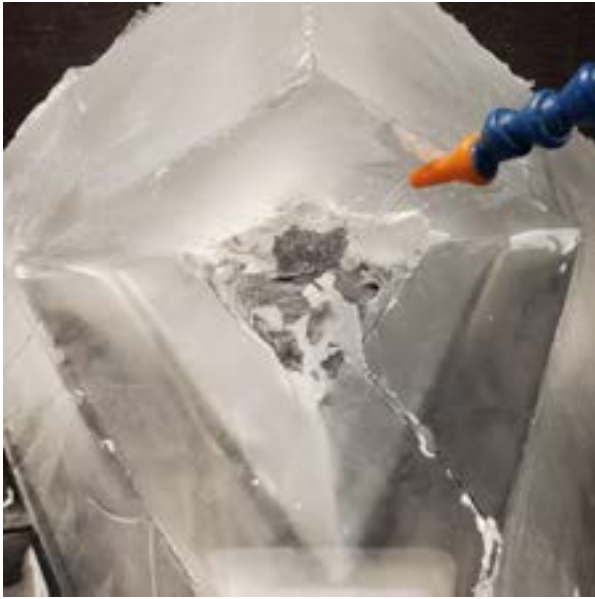
Some parts of the glass would be left unpolished because they could not be reached with the available tools. As a result the hand of the maker would be present in the piece revealing parts of the process going all the way back to the model making stage.





Excess glass would first be removed using the wet saw.





Several castings were found to have a glass web between the inner edges. The webs would be removed using the dremmel tool. Small cracks in the web continued into the piece however the cracks were largely superficial and the structure was not compromised. In one case low viscosity UV glue was used to seal a crack.

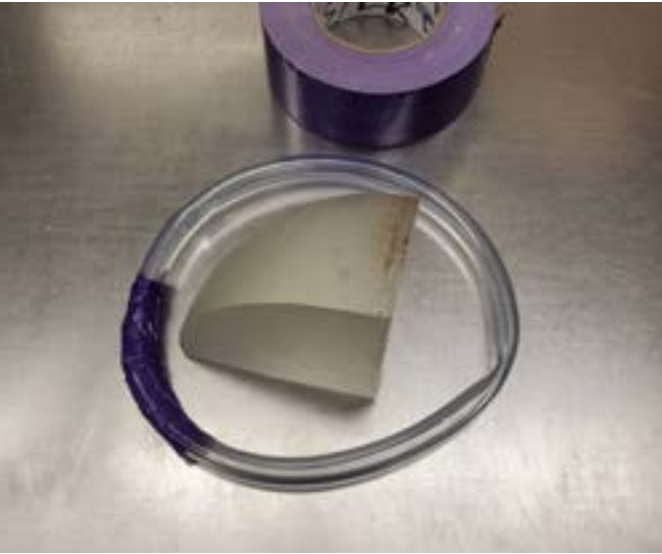






Each exterior face would then be marked using a marker and hand lapped or in some cases placed on a lap wheel(left). Once the marker is gone I know that the surface is flat and that I can continue to the next grit. Hand lapping used 80, 120, 200, 400, and 600 grits.



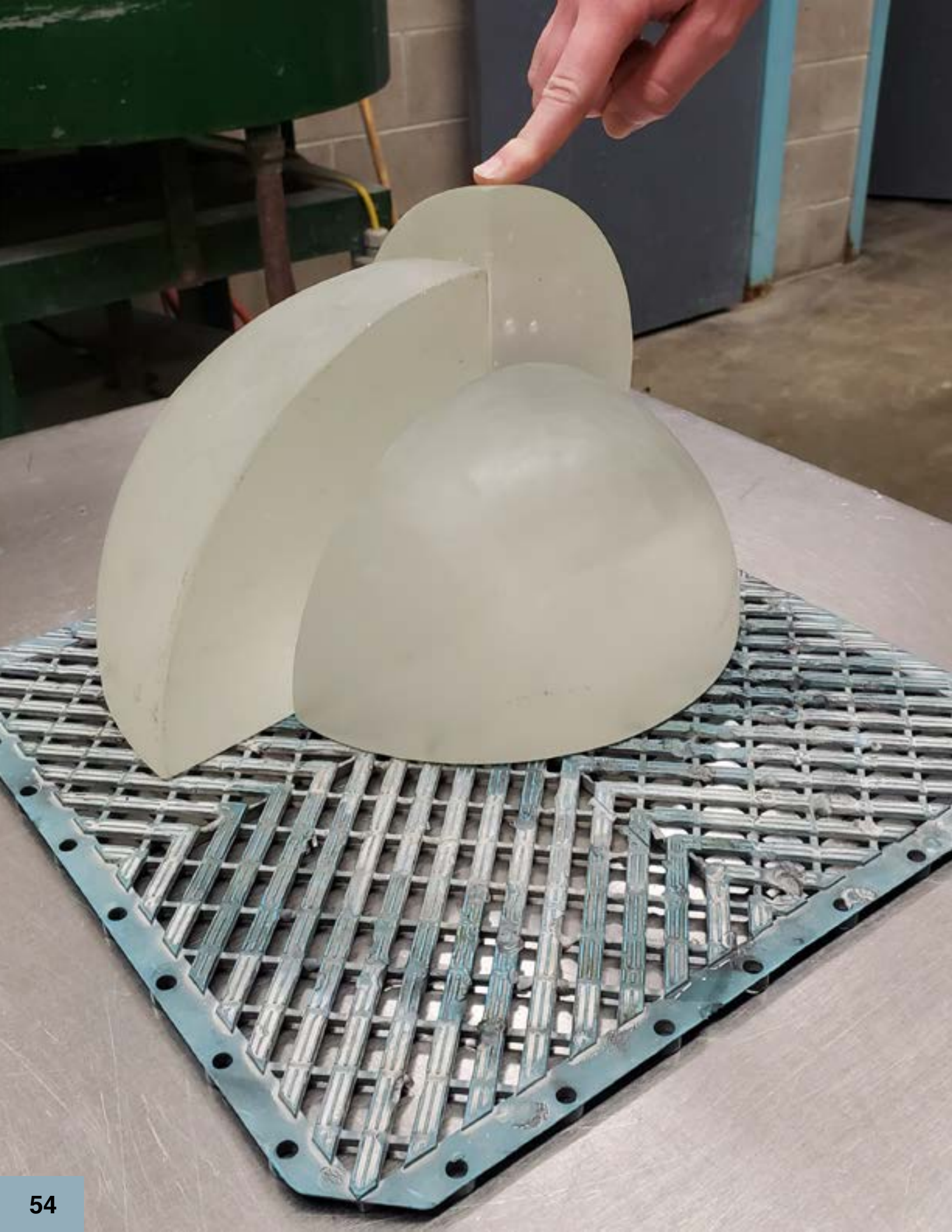


The reciprolap was used on some pieces to create flat surfaces. This machine operates on a motor with an off center counter weight, turning the plate forward and back. Once water and grit have been added to the plate the piece can be placed on with a bumper made from rubber hose.



Many chips, cracks, and breaks can occur during cold working. The slightest misstep can result in the loss of a piece at any stage in this process. This page shows a broken piece that was caught on the felt wheel during the final polish.





After the sand casting process in particular, there were a number of components with which I could conduct aesthetic research and tests. Sphere sections of one quarter and of one eighth, which varied in scale could be arranged in various ways. Arranging glass pieces in an experimental way was more similar to sketching than assembling and planning a piece. Arrangements can be made and remade, compared and weighed against another. Creating simple arrangements was a trial which sometimes proved difficult as I asked myself how a single line or point could be effectively used rather than simply increasing the number of surfaces and faces.

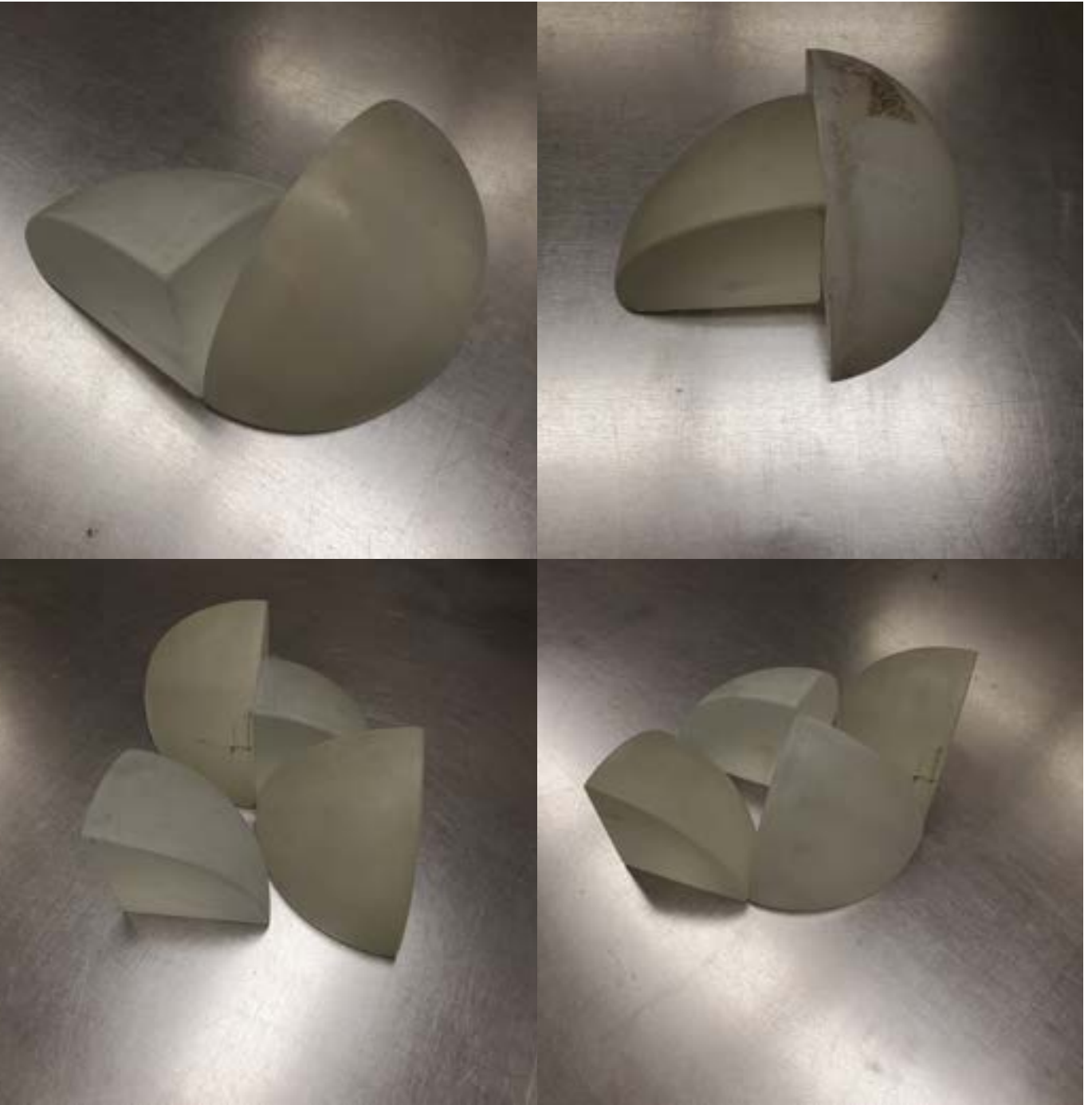


VISUAL TESTS

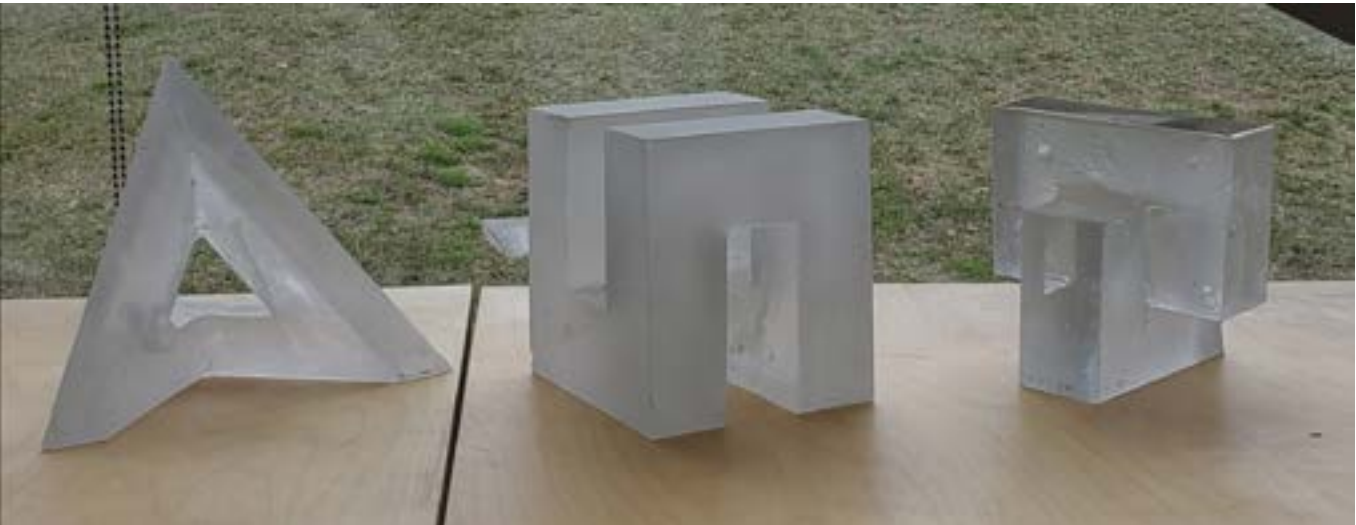








PRELIMINARY RESULTS



Determining the viability of each design would be a careful process. The use of 90 degree angles would need to be tested and as previously discussed in other sections various casting methods. The objects would need to have both optical and structural integrity. Despite being warned that these pieces would more than likely fail because of the number of internal angles, I decided to proceed anyway. If the tests could be successful at a small scale then they would more than likely work at a larger scale.







With these sandcastings it was determined that a piece with multiple right angles could be made. Although the test was for angles the forms themselves were largely improvisational and resulted in these architectural forms.





Negative Space

Modular sculpture and study of 1960's american abstract minimalist sculpture.

2022

Kiln formed and polished glass

15x15x15cm

This piece tested internal right angles and the longer right angles on the external faces while also testing whether these angles would be possible at all with a kiln cast piece. All results were positive as well as maintaining the optics while using the slug casting method.





Positive Space

Study of 1960's american abstract minimalist sculpture.

2022

Kiln formed and polished glass

15x15x15cm

Given the positive results of the previous two pieces moving along with this Tony Smith inspired piece was a promising. The resulting piece was successful with the exception of some veiling and plaster that contaminated the optics.





Chevron Test

Kiln formed, polished, glue

2022

15x15x15cm

This form was derived from a cube. The piece was slug cast and the results were positive optically and structurally. Unfortunately the piece was broken while polishing but was glued back together after the fact.





Positive Space, casting test with clear glass. This test was a complete failure as the glass completely devitrified accentuating the physical form but ruining the optic quality of the glass.



Negative Space, colour test. With using clear glass in the Positive Space form I wanted to create a juxtaposition using colour. Although the adjacent pieces were interesting devitrification resulted in cracks.





Positive Space

Scale test

2023

23x23x23 cm

This piece was an unfortunate failure. The piece was discovered to have cracked while annealing. Cracks were structural occurring on the inside joints of the pieces rendering it unworkable. Possible solutions may be to adjust the annealing program or to add paper to the plaster silica mix, allowing the plaster to break and give way allowing the piece to contract without any resistance from the mold.





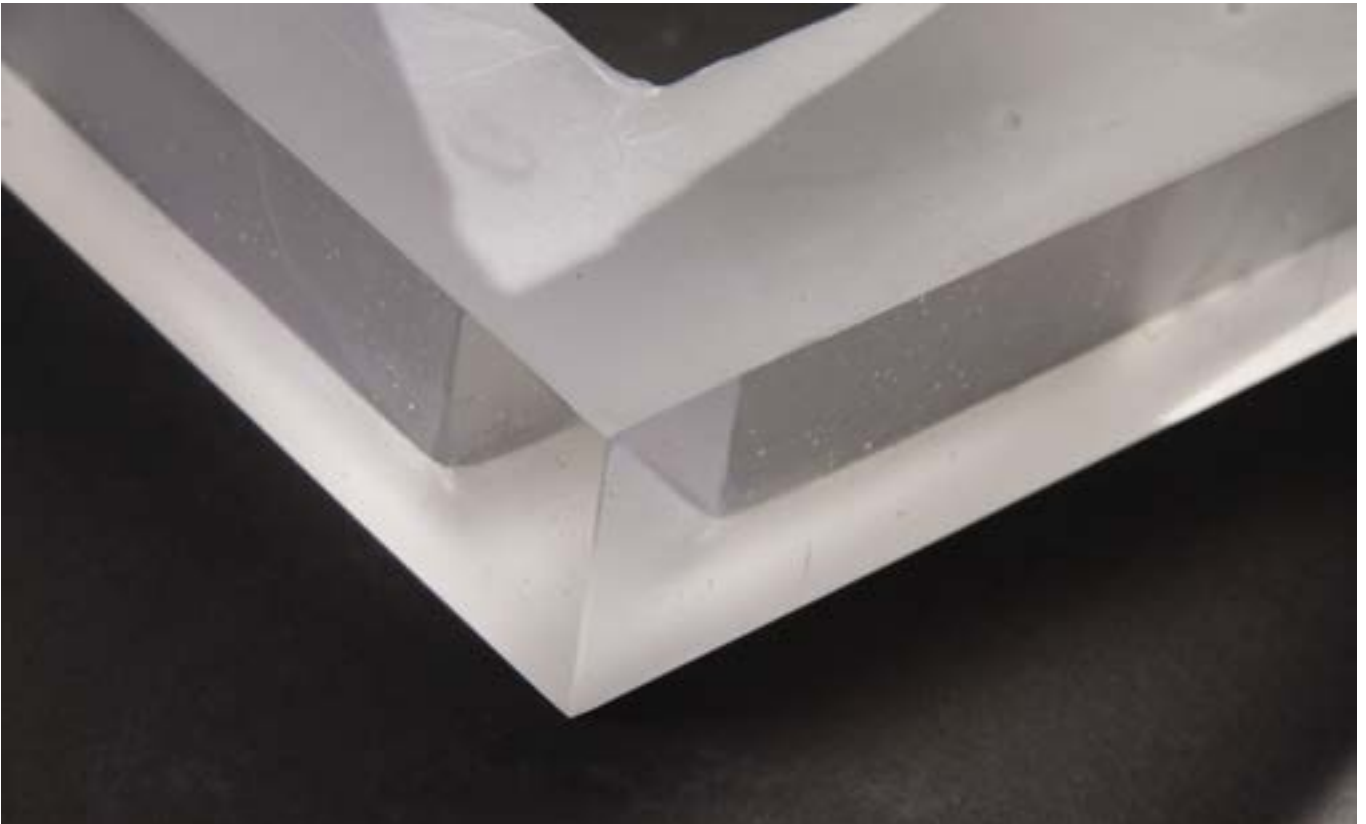
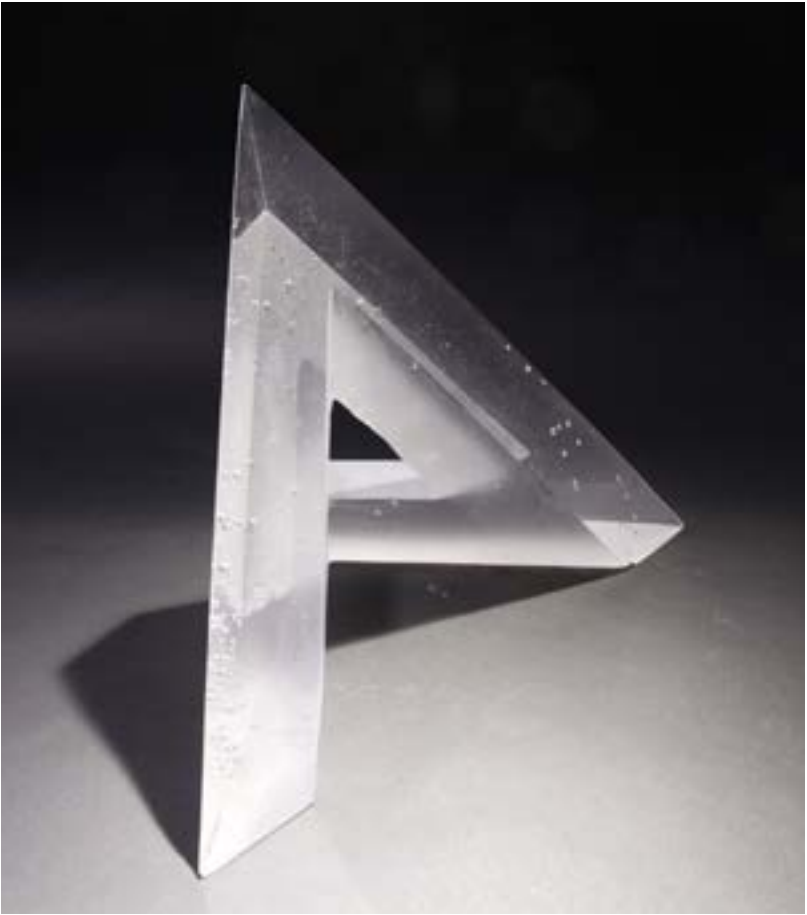
Chevron

This piece is considered the culmination of my geometric studies and foray into abstract minimalist sculpture using the point, line, and face to sculpt a form.

2023

Kiln formed and polished glass
30x30x30cm





FINAL RESULTS

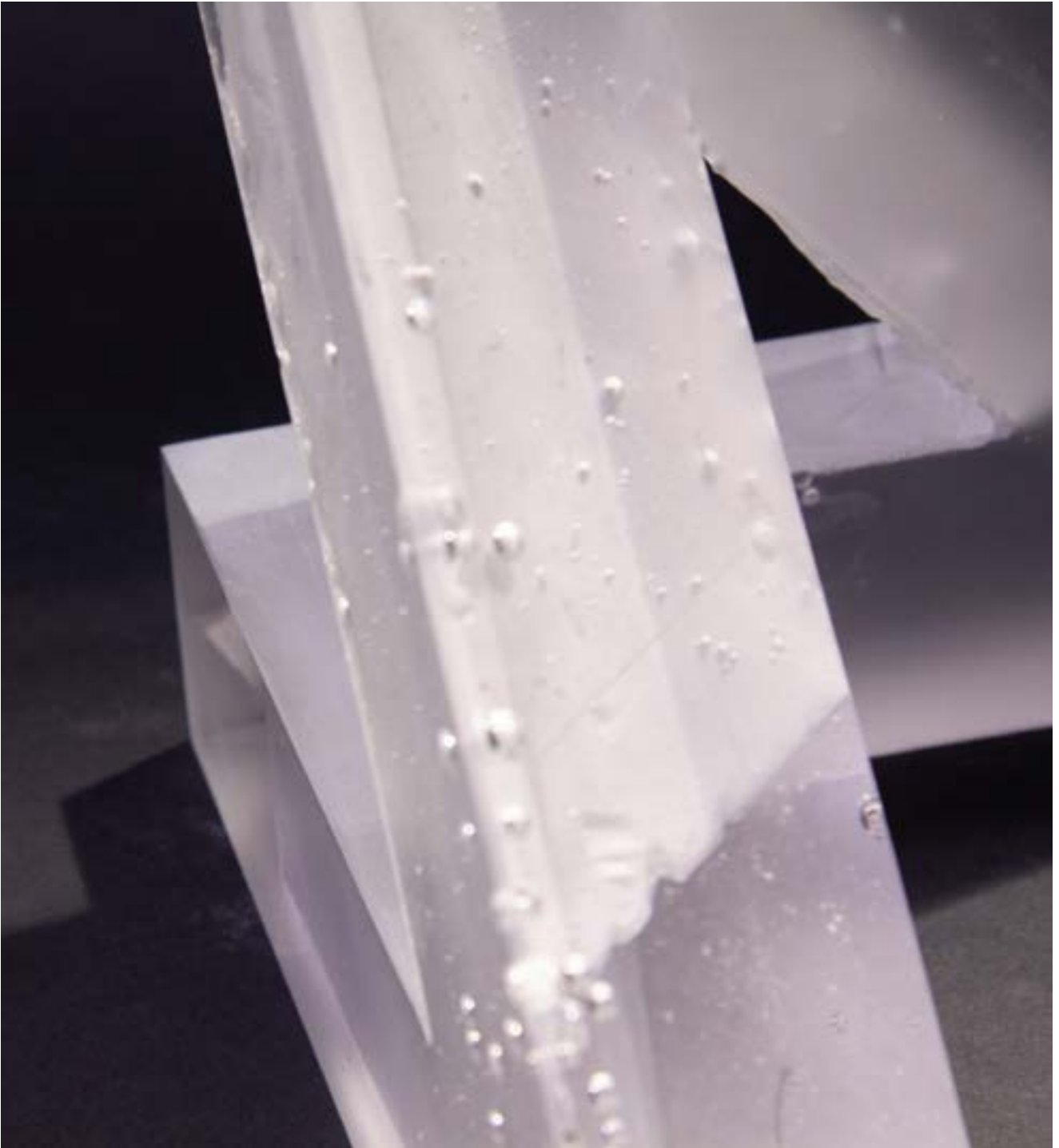




FINAL RESULTS







The results of this piece were better than could have been expected. It was a surprise that the piece remained in tact and that the result was replicated successfully. Additionally, the optics of the piece, which multiply the form on the interior were so successful that they bear further exploration.



Bibliography

Lind, Maria. Barr, Alfred. Abstraction "Cubism and Abstract Art" pg 28-47. London: Whitechapel Gallery, 2013.

Ornes, Stephen. 2019. Math Art : Truth, Beauty and Equations. New York, NY: Sterling Publishing Co.

Smith, Tony, Robert. Storr, John. Keenen, and Joan. Pachner. Tony Smith : Architect, Painter, Sculptor. New York: The Museum of Modern Art, 1998.

Judd, Don. Specific Objects, 1964. Donald Judd Text, Judd Foundation

Lewitt, Sol. Paragraphs on Conceptual Art. 1967, Art Forum. Massachusetts Institute of Technology Press 1999.

Images

Fig 1. Edmark, John. Nested Nautilus Tower. <http://www.johnedmark.com/#!/nesting/>

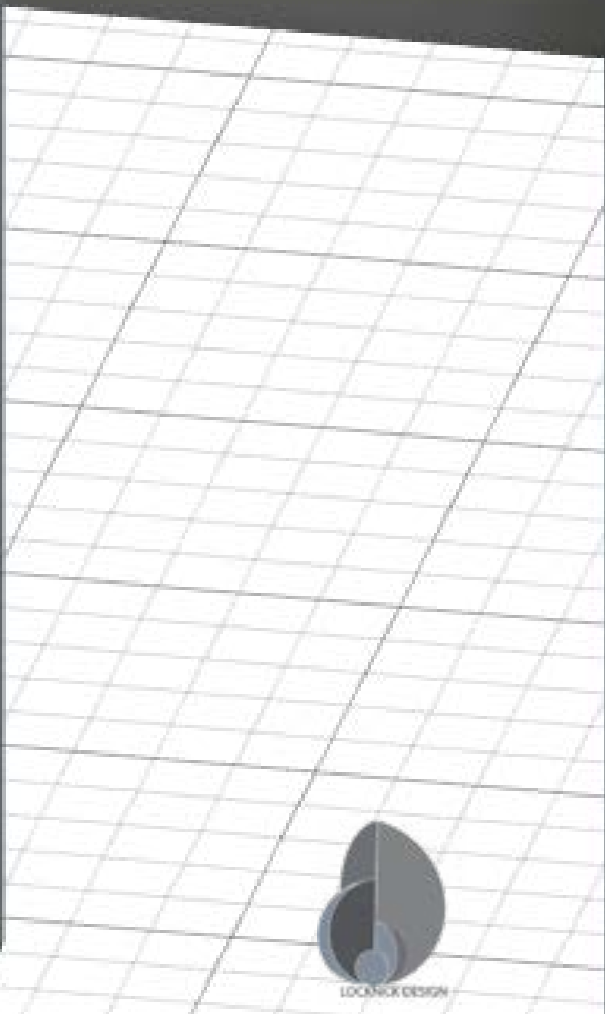
Fig 2. Smith, Tony. We Lost. 1962 <http://www.tonymithestate.com/artworks/sculpture/we-lost-1962/2>

Fig 3. Brachlow, Heiki. Theme and Variations. 2010. http://www.heikebrachlow.com/HB_Frameset.htm

Fig 4. Hora, Petr. Montan 2015. <http://www.petrhora.com/gallery/latest-works>

Fig 5. Brzon, Tomas. <https://www.glassart.de/glass-artist-tomas-brzon/>





LOCKRICK DESIGN